TELEPHONE ENGINEER

MANAGEMENT • ENGINEERING • MAINTENANCE

NOVEMBER 1937

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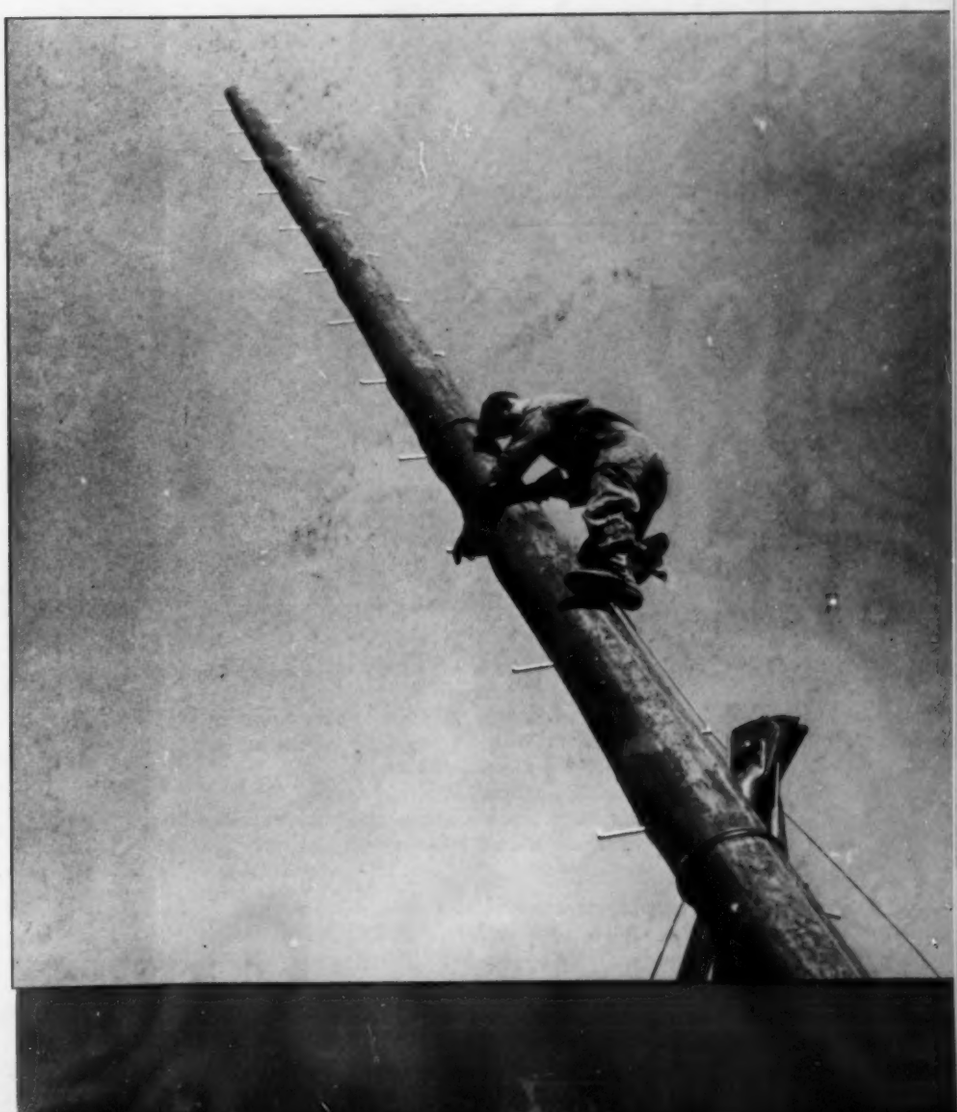

THE 1938 "BLUE BOOK" of the *Telephone Industry*

Publishing date, January 15
Closing date, January 1

Space reservations should be made immediately

"Buyers" Guide Published for the 5 Billion Dollar Telephone Industry

5* Features to Assist Suppliers do a Complete "Selling" Job 50% Bonus Circulation no Extra Charge

Goes to EVERY Telephone Co. Buyer in the U. S. As a Part of Our REGULAR January Issue

1 Complete directory of telephone equipment and supplies with names and addresses of manufacturers and suppliers.

2 Over 5,000 distribution to key factors involved in the design, specification, purchase, installation and operation of all types of equipment and supplies.

3 Manufacturers and suppliers will be listed in three ways — under "PRODUCTS CLASSIFIED"; under "TRADE NAMES" and under "COMPLETE NAMES and ADDRESSES."

4 Names of manufacturers and suppliers with advertising in the January issue will be prominently "spotted" throughout the Buyers' Guide Section with reference to the fact that their advertisements appear in this issue.

5 The January issue of TELEPHONE ENGINEER, with its Buyers' Guide, will be kept and used throughout the year by operating men.

In rapid succession come the reports from various state utility commissions with their decisions outlining their policy on questions involving the telephone industry and REA. Editorializing in this issue we specifically mention and commend the Kansas and Nebraska Commissions; and now Iowa comes to the fore with their ruling that REA must share metallicizing costs in their state. We are reminded of that old war song "Everybody Was Out of Step But Jim."

▼

With the Rambler our rambling, the Turkey nearing the block, and constant reminders that there are so many shopping days till Christmas, we here at the office are looking forward to additional improvements to TELEPHONE ENGINEER we have scheduled for the new year of 1938. Refusing to "view with alarm" and giving thanks for our ever increasing reader audience, we are indeed glad to greet this Thanksgiving Day as one that has seen the independent telephone industry rejuvenated and looking ahead to a very pleasant future.

▼

In presenting in this issue our new feature "Long Lines" edited by Robert A. Clark, Jr. we are indeed proud to have this popular author return to our columns. The many favorable comments received from our readers lead us to believe the feature will prove as popular as his last series that caused so much comment.

TELEPHONE ENGINEER

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LACK of growth in a town is no longer a reason for any exchange to become stagnant, regardless of its size. For those who may have become discouraged, the Masterbuilt Junior is like a tonic. It brings new life, hope and encouragement to the telephone man, because this equipment answers his problems cheaply, thoroughly and easily. It brings more revenue and satisfies his subscribers.

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Editorial « « «

Kansas and Nebraska Commissions Answer REA

Too much commendation and praise cannot be given the Kansas Corporation Commission and the Nebraska State Railway Commission for issuing recent orders maintaining their jurisdiction in respect to the construction of rural electrification lines, especially where they cause interference on existing telephone lines.

These two commissions have let it be known that they still exercise the jurisdiction given to them by their State Legislatures. By doing so they have given a definite and direct answer to the Federal Rural Electrification Administration, which has been and is at present claiming that state commissions do not and should not have jurisdiction over the conditions, rules and regulations under which rural electric lines shall be constructed. The REA has strenuously opposed the authority of state commissions to make rules pertaining to financial settlements between rural electric projects and telephone companies for the elimination of electrical interference from telephone lines.

The Kansas Commission has ruled that it is the duty of any utility company using the highway for transmission purposes to construct its lines according to the best known methods to prevent interference. In the case of the Brown-Atchison Electric Cooperative Association, Inc., the commission has ruled that the plans and specifications as set forth in this Association's application to construct transmission lines are not approved unless they are so modified that no conductor of the electric transmission lines is grounded and when so modified such plans and specifications shall be approved; provided that subject to the approval of the commission mutual agreements may be made by the parties (electric association and telephone companies) relating to the use of grounded conductors where lines (electric and telephone) parallel on the same highway.

In Nebraska the Loup River Public Power Project has made application for construction of 354 miles of rural electric lines of which about nine miles parallel the telephone lines of the Skeedee Telephone Co. of St. Edwards. The telephone company has protested the construction of these paralleling lines. The Nebraska law vests in the Nebraska State Railway Commission the authority to grant or deny applications for wire line construction. The law also prohibits the construction of lines in proximity to existing lines, where such construction impairs the efficiency and operation of existing wire companies.

In this case the Nebraska Commission has directed the officials of the power project to confer with officers of the telephone company, stating that if an agreement cannot be reached the commission will take up the matter. The commission further ordered that if an agreement is not reached to pay the cost of damages which the power lines cause to the telephone lines, the application of the power project will be denied.

The Kansas and Nebraska Commissions have dared to protect their authority in the face of veiled threats on the part of the REA that unless, it is allowed to construct rural electric lines without regard to damage they cause to the rights and property of others, it is doubtful if additional funds will be forthcoming from the Federal Government for the construction of rural power lines. We have said before and we say now that these veiled threats are "blows below the belt" and it is refreshing to see two state commissions carry out their responsibility and duty regardless of unfair tactics which might be used against them.

Telephone Engineer congratulates and highly commends the Kansas and Nebraska Commissions for their action to protect their jurisdiction. In our opinion they have taken an important step to protect their overall authority, for if they allow one portion of their jurisdiction to be destroyed then they leave an opening for a general "sniping" campaign against all of their authority which in time could easily jeopardize their rightful and necessary existence.

The Kansas and Nebraska Commission have certainly set a commendable example, which all commissions should consider following.

TELEPHONE ENGINEER
MANAGEMENT • ENGINEERING • MAINTENANCE

NOVEMBER, 1937

"Tapping In" On Washington

By ROLAND C. DAVIES
Editor
Telecommunications Reports

WHAT NEW course will be steered by the Federal Government in its attitude towards business and utilities during the new session of Congress because of the recent recession of industrial activity has become the object of greatest attention and interest.

The bewildering maze of events and issues in Washington is difficult to sort out into a forecast of what results will be consummated. But there seems to be several definite indications in the offing. First, Congress in its present special session that started Nov. 15th, appears to be more independent minded and less subservient to the reform advocates of the administration and this attitude may be carried forward into the regular session, commencing in January. Second, with this attitude of an independent Congress, more prone to legislate measures of constructive help to business and not so willing to institute harrassing reforms, a reflex of this viewpoint will undoubtedly be translated into the activities of the executive agencies of the Federal Government, like the FCC Labor Board, etc.

● Rather than steaming ahead with the consideration of the Administration's five-point program of new reforms, such as wages-hours, crop control, and the "seven TVAs", the special session of Congress is more concerned with the aim of alleviating the tax burden upon business, especially small companies, which brings a ray of hope to the Independent telephone industry, and also with the difficult task of slashing government expenditures to atain the hoped-for goal of a balanced budget.

The labor conflict, particularly the jurisdictional battling between the C.I.O. and A.F. of L., too, bulks large in Congressional consideration, because there is a growing realization that in the scrapping between the two unions it is the employer who is "squeezed" the hardest and the public likewise suffers. Incidentally, workers themselves appear to be suspicious and wary of the fight between the two labor factions, because for the past month there has been an increasing number of victories by independent employee unions or employee representation groups over the C. I. O. and A. F. of L. in collective barganing elections conducted by the National Labor Relations Board.

The Federal Communications Commission is now in the thoes of its adminstrative reorganization and "cleanup" under the leadership of its new Chairman Frank R. McNinch so policy-making and study of telephone regulatory problems are largely at a standstill . Next the Commission is expected to concentrate upon broadcasting policies, particularly ownership of stations by chains and newspapers, and possibly upon the controversial subject of broadcast programs. After the broadcasting situation is fairly well clarified, it is indicated that communications will form a principal subject of consideration by the Commission.

● One important telephone topic, however, will be brought before the Commission in mid-December, according to the present plans, when the entire Commission is slated to commence its study of the Telephone Investigation report to Congress. A corps of the former Investigation staff is now in the throes of drafting the report under the direction of Commissioner Paul A. Walker. This report will be submitted to the entire Commission for revision and approval. While a recent newspaper article forecast that the Investigation report would direct most of the FCC fire against the Western Electric Co. and telephone manufacturing prices, Commissioner Walker stated that no official announcement of the FCC's probable recommendations to Congress had been made. It is also known as a further substantiation in the status now of "pure speculation" that none of the Commissioners, except Commissioner Walker, is acquainted with the proposals and recommendations which are being devised for the report.

The Prudent Investment Theory

A most interesting and important development in Washington has been the recent drive on the part of President Roosevelt and the Federal Commissions to bring to the forefront the theory of "original cost" or prudent investment as the basis for utility rate valvation. The President seems to be enthused with the idea that this principle should be adopted as the predominant rule for establishing the utility rate base. While

he is now engaged in extending the "olive branch" to the power utilities to induce them to launch a $2,000,000,000 construction program, the President also wants to drive home to utilities of all types that he considers "prudent investment" must be accepted as the dominant valuation method.

The stir of discussion on the subject of prudent investment arose as a result of the rehearing granted by the U. S. Supreme Court in the case between the California Railroad Commission and the Pacific Gas & Electric Co. The Supreme Court last June by a 4-4 vote upheld the lower court's ruling in favor of the company, but this fall the highest court by an unusual action decided to reopen the case for a rehearing.

What is sought by the Administration is that the Supreme Court should discard the Smyth vs. Ames rule of valuation, which included reproduction cost new as an important element of establishing the rate base, and should make the "original cost" or prudent investment theory as the outstanding medium of determining valuation. The Smyth vs. Ames case upon which reproduction cost was based as a leading valuation element was decided in 1898 and it will be recalled that at that time utility regulatory authorities hailed the reproduction cost theory as the way of curbing excessive utility rates. Now the utility regulators, who at the time of the Smyth vs. Ames case opposed original cost, have become ardent advocates for the sole recognition of historical cost.

In the recent argument before the Supreme Court on the Pacific Gas & Electric rehearing, the Federal Power Commission led the assault on the reproduction cost principle, while the FCC presented a theory that, if a commission considers evidence and rejects it as it did in the case of the Pacific Gas & Electric Co.'s reproduction cost testimony, no lack of due process occurs unless it is proved confiscation results. Both the FCC and the National Association of Railroad and Utilities Commissioners emphasized that the courts should not assume the power of rejecting the methods of commissions in arriving at rate decisions unless actual confiscation occurs, unless the commissions have violated procedural due process as in the **Ohio Bell case** or have arrived at their rate orders through fundamentally unsound methods as in the Maryland telephone case.

The Power Commission carried the "ball" for the "prudent investment" principle. In its brief and argument before the Supreme Court, the Power Commission presented the Administration's theory of utilizing "original cost" as the dominant valuation element for utility rate-making to the Supreme Court in this succinct paragraph. "The case at bar offers the Court the opportunity to write off the books this paralyzing and stifling rule of rate-making (reproduction cost new). The prudent investment principle is the sound economic solution and presents an avenue of escape from long-drawn-out, tedious expensive and uncertain valuations."

The prudent investment principle was declared by the Power Commission to be entirely consistent with the requirements of the Fifth and Fourteenth amendments. In its brief, this Commission struck hardest at the alleged economic waste involved in the "fair value" method, which embraces the original cost and reproduction cost elements of valuation and stated that "there must be substituted a plain and adequate remedy" such as the prudent investment principle. Fair value has had a fair trial and by the verdict of 39 years of regulatory experience it has been found wanting, the Power Commission brief added.

Safety Bulletin

The danger season of the year, when weather conditions add to the hazards of driving is here. Snow, rain, squalls, slippery roads, all tend to increase the ever present dangers of the highways. Slow and careful driving, good mechanical equipment, refusal to take summer time chances, will help the driver of a telephone company car to avoid accidents. Driving during the winter months is a matter of common sense judgment.

The Power Commission did admit in its brief that the reproduction cost principle was originally set up in utility valuation as a result of the campaign on its behalf by advocates of lower rates. The Supreme Court in its Smyth vs. Ames decision in 1898 recognized this rule because it felt railroad rates should not be based on original cost which contained many factors of inflation. However, the Power Commission contended that reproduction cost as a valuation element was not only speculative because no two sets of valuation engineers could agree on reproduction cost estimates but also was a very expensive and lengthy process. To support its claim about these allegation, the Power Commission cited a list of 123 rate cases between 1928 and 1933 which showed a variation of 51.5 per cent in the various estimates of commission and company engineers. The New York Telephone case was also noted as disclosing a spread of $250,000,000 in the estimates of the commission, court and company engineers.

The very involvements of the fair value method destroy it as a rate making expedient," the Power Commission brief stated. " With some fluctuations in price occurring daily, valuations made as of one year, after many years of effort, are obsolete by the time they are determined. When it is remembered that frequently several years are required to make an inventory and appraisal, which becomes obsolete twelve months thereafter, the criticism that the regulatory process is unworkable must be recognized as well-founded. Regulation must be freed from unworkable formulae or Commission regulation is doomed, for the public is becoming weary of the long, expensive and tedious procedure involved in public utility rate making."

Changes In FCC Procedure

By claiming the three Divisions, Broadcast, Telegraph and Telephone, on Nov. 15, Chairman McNinch and the other members of the FCC instituted a new procedure for the Commission's functioning—the entire Commission will now act on every application and subject of regulation instead of the Divisions handling the various issues pertinent to the respective branches of communications and broadcasting. Under the new plan, the Commission meets once a week on telephone and telegraph matters and once a week on broadcasting subjects. For different phases of the Commission's regulatory work an individual Commissioner is to take charge of the studies and work and then will report his findings to the entire Commission. The new program of functioning is expected not only to correlate the problems and subjects of common interest in the communications branches of the telephone and telegraph but also will relieve the Commissioners of considerable detail so they can devote themselves more thoroughly to policy-making.

Another move was launched by the Commission to counteract the criticism of political and outside influencing of the FCC's decisions, especially in the authorization of broadcasting stations. Chairman McNinch has instituted rules so that every inquiry seeking to advance the merits of a pending case is to be recorded at the office of the FCC Secretary and will become a part of the public record in cases. He indicated that this rule would apply to members of Congress and the Democratic National Committee as well as private individuals, and will mean that any attempts to influence the Commission will be publicly known. The

(Please turn to page 33)

INDEPENDENTS Break All Records at 1937 Meeting

The United States Independent Telephone Association 41st Annual Convention held October 12-15 was voted best in years. Business Sessions were well attended. Discussion on Depreciation was Highlight. Pass resolution regarding Inductive Interference.

WHEN the United States Independent Telephone Association met for its 41st annual meeting in Chicago, they were greeted with: the largest attendance ever to attend; a bang-up program that filled the sessions rooms to standing room, and resulted in several decisive actions by the committees in charge.

Besides the general sessions, conferences on accounting, commercial, plant and traffic proved most instructive with congratulations being heaped on the program committee for their choice of speakers to these groups.

Speakers of renown outside of the telephone field were interspersed in the program, giving those in attendance a well diversified 4 day meeting that many have since stated was the most entertaining of any national convention ever attended by them.

● Speakers in the industry presented real discussions with no punches pulled. The address by President John H. Agee and his comments from the chair during the sessions coupled with talks of such well known Independent men as E. C. Blomeyer, Stanley Edwards, L. M. Berry and Edwin M. Blakeslee were unusually instructive with copies of these addresses being in wide demand.

J. H. AGEE
President

The discussion on the rulings of the REA by C. C. Deering and a resolution passed by the assembled convention gave the Independent telephone industry's answer to the drastic "about face" this government body made by refusing to consider adjustment on inductive interference rulings detrimental to the industry. The result of these thumping talks by leaders in the industry caused much comment by departing members on Friday, the 14th when the final sessions were held in the forenoon.

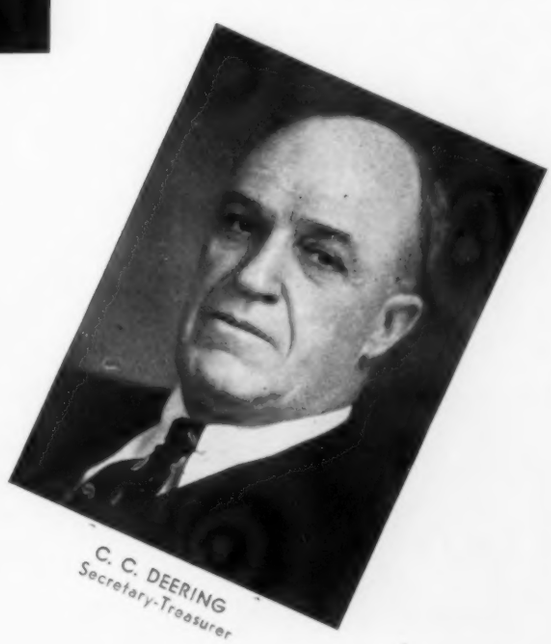
○ With the selection of John H. Agee, as president, the association honored the vice president and general manager of the Lincoln, (Nebr.) Tel. & Tel. Company to succeed himself after his elevation on the death of the late president F. B. MacKinnon. Louis Pitcher was reelected executive vice president, as was the most

LOUIS PITCHER
Executive Vice-President

THE CAPTAIN AND HIS CREW

▼

Selected to Lead the Association For 1937-1938



C. C. DEERING
Secretary-Treasurer

One and only Louis Pitcher! He was re-elected executive vice-president

E. C. Blomeyer talking on Depreciation Camerman—E. C. Blomeyer, Jr.

J. G. Crane has the Floor! In better health than ever, thank you.

Touring
The Convention with a Candid Camera

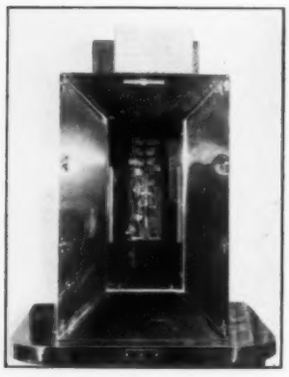
The Electric Storage Battery Co. exhibit—Exide to you!

George W. Rodormer was out when the Reliable Electric Shot was snapped.

Robert Smith of Pa. listening. Mr. Perry and Mrs. Blomeyer talking about George Perry in Cali, Colombia. S. A. Bob Perry with the cigar and a happy mood.

Oscar Burton of Texas enjoying his first Pioneer banquet.

B. C. Berting of the North Electric Co., playing to a full house.

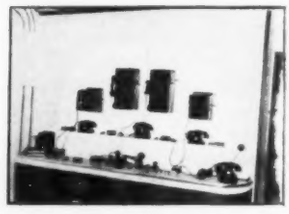


Demonstrating dependability of Automatic switches by enclosing in sub-zero cabinet was only part of the showmanship displayed by Automatic Electric in their beautiful exhibit.

This beautiful colored handset exhibit by Stromberg-Carlson caught the cameraman's eye, and who can blame him?

Cameramen:
4-5-6-7-9-11-13 Ray Blain
1-2-3-10-11-12-14 E. C. Blomeyer, Jr.

"When The Rainbow Comes Out" is amply described in the exhibit of Cook Electric. John Jaap was the designer.



Roy Siemund and Leich Sales Corp. deserves a better break than the camera reveals in this shot. Their exhibit with its striking colors was very colorful.

Louis Pitcher's valuable aids at the registration desks opening day.

Mrs. Blomeyer and Louis Pitcher greeting Oscar Burton who is having trouble ducking the camera.

affable C. C. Deering, secretary-treasurer for many years. E. R. Hannibal of Everitt, Washington and B. L. Fisher of Martinsville, Virginia were also honored with vice-presidencies. Among new directors was Carl D. Brorein of Tampa, Florida, who succeeded W. G. Brorein who had served for many years, and on his resignation, is to be recipient of a resolution for his long and valuable assistance to the association. Other new directors were G. B. Foscue, able vice president of the American-Automatic Electric Sales Company; R. A. Lumpkin, president, Illinois Southeastern Telephone Company, Mattoon, Illinois and John H. Wright, one of the real pioneers, and president of the Jamestown (N.Y.) Telephone Corporation. An entire list of the directors reelected is carried in the box on this page.

On opening day it soon became evident that the ever increasing throngs registering at the various desks provided by Louis Pitcher and his assistants would result in a new record attendance. The entire morning saw many old friends renewing friendships and many of the old pioneers who had been absent the past few meetings reunited and busily reminiscing as is their want. The delegation from California was much in evidence. Heretofore the past few years saw only one member from "sun kissed" California in attendance. The entire west coast was well represented and were amply repaid for their long journey.

● From Canada came H. A. Rogers of the Canadian Telephone News accompanied by Captain R. G. Cavell of the Canadian Telephones & Supplies, Ltd., to invite a number of the telephone fraternity to their convention in Canada held just after this one. Florida was represented by members of the Peninsula Telephone Company and the Florida Telephone Corporation. From Maine came the very popular W. J. Thompson, president of the China Telephone Company. Many others from distant points were in evidence.

At the directors meeting held on opening day, president John H. Agee had the pleasure of introducing Oscar Burton of Texas; J. H. Tierney of Weare, N. H.; and C. F. Mason of Long Beach, California, who were attending their first meeting of the board. During this meeting a committee was selected to draw up a resolution regarding the inductive interference problems with the REA. President Agee nominated the following to serve on this committee: Alfred G. Geiger, of Washington, D. C.; Oscar Burton of Tyler, Texas, and Louis Pitcher of Chicago. The resolution was drawn up and passed by the Association.

● Speakers outside the industry provided much entertainment and assisted greatly in the presentation of a well rounded program. Dr. J. L. Davis of New York, in his semi-serious address "The Echoes of Life" literally laid them in the aisles with his amusing, and equally brilliant rapier thrusts to the more serious vein at a moment's notice. Capt. J. W. Craig was a very able "pinch hitter" and presented a thoroughly interesting discussion on photos of deep sea life and a description of the part communication had in underwater work both in photography and the raising of sunken vessels. The Lapp-Hanna Symposium with the two speakers giving divergent opinions in a discussion was well attended and very appropos in view of present governmental trends.

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"An apple a day" and you must see National Carbon—part of the Minnesota delegation talking things over.

Even the cameraman sat down after this shot.

C. F. Kelley (left) vice president of Signaphone explaining their exhibit. He was on the program too.

J. K. Johnston, ready to sign up Pioneers at the registration booth.

Dr. Davis, guest speaker, did not pose for this, but it is a characteristic pose.

The Kellogg Masterphone exhibit shares the spotlight with vice-president H. E. Billington and president Geo. A. Yanochowski (right) in one of their Kellogg Switchboard and Supply Co. exhibit rooms.

Only One Hero!

Act VI of
Showmanship in Business

by
ZENN KAUFMAN

SEVENTEEN million people will go to the movies today and will pay an average of 21 cents to get in. What will they get for their money? Actually, of course, they will get a little two-inch piece of cardboard called a ticket, which entitles them to sit quietly for 2 hours and 28 minutes to see and hear the show.

Did I say *actually?* No word could be more wrongly used.

Actually—they paid their 21 cents for the right to step right up on the screen and enjoy the thrill of hobnobbing with Gable and Loy. A million gals without romance will find love thrills in the voice of Dick Powell. Millions of men will forget that their wives are sitting beside them and will spend their 2 hours and 28 minutes in the arms of Ailce Faye.

Similarly, when Jack Benny uncorks some of his sarcasm on Mary Livingstone next Sunday night, a million men will find in his words the very things that they would like to—but dare not—tell their own wives. For, without exception, the great shows use you and me as their leading men. While Carl Hubbell's name may run in the headlines of tonight's baseball finals, the 740,000 men who watch today's baseball game get their chief thrill out of picturing themselves warming up in the pitcher's box and burning them over for three strikes on every man.

Louis may get a $200,000 check for knocking out Braddock before a crowd of a hundred thousand, but, rest assured, nobody uses the ringside seats while the fight is on, because every man is down in the ring pushing out his own left hooks and right jabs—while thousands cheer! Millions of men too anemic to fight express themselves in the glory and homage they pay to their prize ring idols.

All shows are alike in this one respect, whether it's Camille's tears, Powell's kisses, Cantor's humor, Braddock's hooks or Hubbell's strikeouts. The audience is always on the screen, at the microphone, in the prize ring, or in the pitcher's box.

KEEP THE PROSPECTS ON THE STAGE

No selling can be successful that does not apply this principle—*that the prospect is the Hero of the Show.* And the *Only* Hero! The most expensive mistake that you, as a seller, can make is to try to be the hero.

Sometimes we call face-to-face selling a drama with the salesman as the hero of the two-man cast. No mistake could be more expensive. There is room for *Only One Hero,* and *he must always be the prospect.* The minute you take the spotlight off *him,* your show is over and you may as well go home. In every theater in the land there is only one dressing room with one star on the door. This is reserved for the most important member of the cast—in your case—the prospect. Don't ever confuse the stage manager with the leading man.

Out west, a Chrysler dealer found that a car placed at one certain spot on the sales floor would sell twice as fast as from any other spot. A check-up proved that large wall mirrors made it possible for prospects sitting in the driver's seat to get full car-length pictures of themselves in all the glory of Chrysler chromium. This only proves an axiom stated years before by Kenneth M. Goode, who told a mail order convention: "Don't tell people how good you make your goods. Tell them how good your goods make them."

Even today the Phoenix Mutual Life Insurance Co. finds that a simple offer of a notebook with a prospect's own name gold-stamped on it will open doors at a lower cost than any other device. And publishers of "Showmanship In Business" tell me that the best pulling mail piece sent out on the book was one in which the prospect's name was written in brush-script across the top of the letter.

The voice Mirror proved to be the most popular exhibit shown at any of the Southern Fairs. At the Southeastern Fair, Lakewood Park, Atlanta, Ga., 13,398 people waited their turn to hear their own voices over the voice mirror. Most people even prefer their own voice.

Spotlighting the other fellow is the sure way to get his interest or, more properly, his action in behalf of your interest. Sales contests boost telephone installations because contests give each

(Please turn to page 39)

FREE—Readers of the Telephone Engineer may have a copy of the Showmanship Yardstick — a 12-notch check list of showmanship elements. Just send us a self-addressed stamped envelope. We'll do the rest.

Acknowledgement is made to Harper & Bros. for permission to reprint parts of "Showmanship In Business" by Goode and Kaufman.

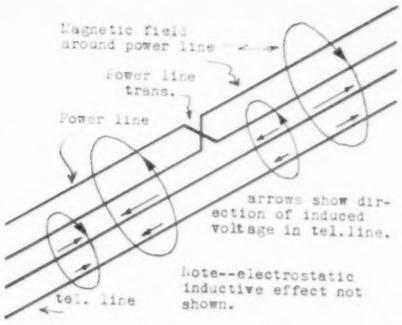

Magnetic field around power line
Power line trans.
Power line
arrows show direction of induced voltage in tel.line.
Note--electrostatic inductive effect not shown.
tel. line

Fig. 11—Neutralization of Induced Voltage by Power Transposition

Minimizing Inductive Interference

Part II
Power and Telephone Transpositions

By
B. C. BURDEN
Transmission Engineer, L. T. & T. Co.

Power Transpositions

One of the principal remedies for minimizing inductive interference is the use of transpositions which are placed in both power and telephone circuits involved in a parallel. The term *transposition* refers to the interchange of the relative position of the wires on the pole line. Transpositions are placed at periodic intervals in a line and those placed in power lines serve two purposes. Namely: (1) To equalize the capacity of each of the power wires to ground and to other wires. (2) To neutralize the voltage induced in paralleling telephone circuits.

It can be seen that wires of three phase power circuits arranged on a crossarm, as shown in figure 8, would have unequal capacity to ground inasmuch as the center wire has both its direct capacity to ground and the series capacity to ground through the wires on each side; hence, it would have a higher capacity to ground than either of the outside wires. By the interchange of pin positions of the three wires so that each wire must occupy all of the several position possible in a given section of line, all wires would have (theoretically) precisely the same capacity to ground. This effect is obtained (in three phase lines) by locating transpositions at the one-third and two-thirds points in a line section. At each transposition the wires are shifted to the adjacent pin position. Figure 9 illustrates how the wires are shifted at a transposition point.

For reasons which will later be explained, it is desirable that the balanced sections of power line, obtained by transpositions, be confined to lengths not exceeding 6 to 9 miles and in some cases preferably shorter. A balanced section of line which would contain two transpositions is referred to as a *power barrel*. Figure 10 shows how a power line having a triangular configuration is transposed.

Theory of Power Transpositions.

The manner in which a power transposition is effective in reducing the induced voltage on the paralleling telephone line can be understood by reference to Figure 11. This figure shows a single phase power line paralleling a two wire telephone line. The electro-static and electro-magnetic fields surrounding each of the wires of the power line (because of the opposition polarity of the two power wires) are *out of phase* with each other These opposing fields, therefore, induce in the telephone wires opposing voltages, which tend to neutralize each other. Due to the fact that one of the power wires is physically closer to the telephone wires than is the other, it (the nearest wire) produces the largest voltage in the telephone line, hence, the algebraic sum of the two induced voltages is not zero and the difference voltage is sufficient to

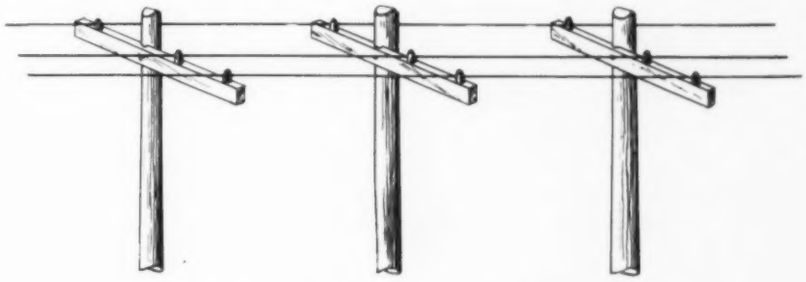


Fig. 8—Untransposed Three Phase Transmission Line

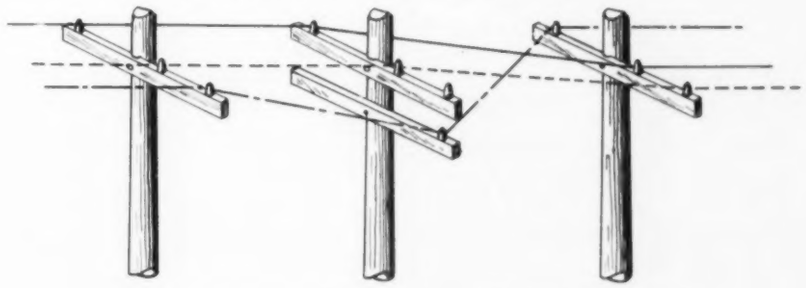


Fig. 9—Transposition Point in Flat Top Three Phase Line

Fig. 10—Transposition Point in Triangular Configuration Transmission Line

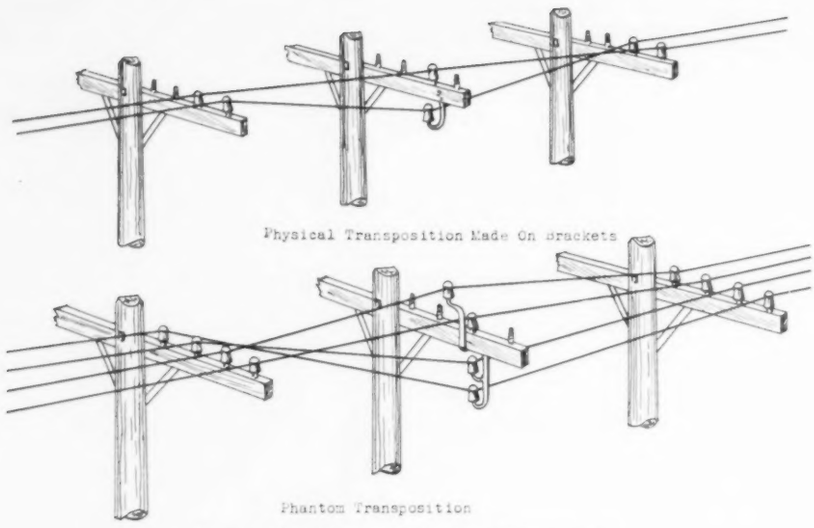


Fig. 12—Two Types of Telephone Transpositions

create some noise. If, however, we transpose the power line at the geographical midpoint of the parallel, we now have shifted the relative positions of the two power wires so that equal and opposite voltages are induced in the telephone line which *theoretically* will neutralize each other exactly and we will have no power noise.

Practical Difficulties

Unfortunately our problem is not quite as simple as the preceeding explanation would indicate. It is true that a power transposition does result in neutralizing voltages in the telephone circuit.

However, this applies only to *balanced voltages and currents* of the power line. The *residual currents and voltages* which act between power wires and ground are not effected by the transpositions in the power line any more than we could obtain crosstalk neutralization by transposing a grounded telephone line. We must, therefore, depend upon telephone transpositions to neutralize the effect from residual voltages and currents of power lines. In general it has been found that power transpositions do not play an important part in the neutralizing of induced voltages in telephone lines, and their chief use is to balance the power line capacity to earth.

Theory of Telephone Transpositions

The principal difference between telephone and power transpositions from a physical standpoint is the fact that telephone circuits are all of the two wire type and at each transposition point, the two wires (or two circuits in the case of phantom lines) interchange position, that is, make what might be termed a 180° shift. Power lines, however, are both of the *single phase* and the *three phase* type and in the single phase type, the interchange of wires constitutes a 180° shift but in the three phase power line, the power transposition goes through only a 120° shift at each transposition point. In other words, each of the wires is shifted to the next pin, hence, we must have two complete transpositions in order to shift each of the wires to all of the possible conductor positions. We say the wires are given "one-third turn" at each transposition point.

Purpose of Telephone Transpositions

Telephone transpositions serve three purposes, namely: (1) *To balance* the capacity of telephone wires to all other circuits carried on the lead and to ground. (2) *To equalize* the voltages induced in the two wires so that equal voltages exist on both of the telephone wires or sides of the circuit. It should be noted that a *telephone transposition does not neutralize the induced voltage*, but rather equalizes it. (3) Telephone transpositions serve the further purpose of minimizing crosstalk between the different circuits carried on the same lead. Figure 12 shows how both physical and phantom telephone circuits are transposed.

Transportation Coordination.

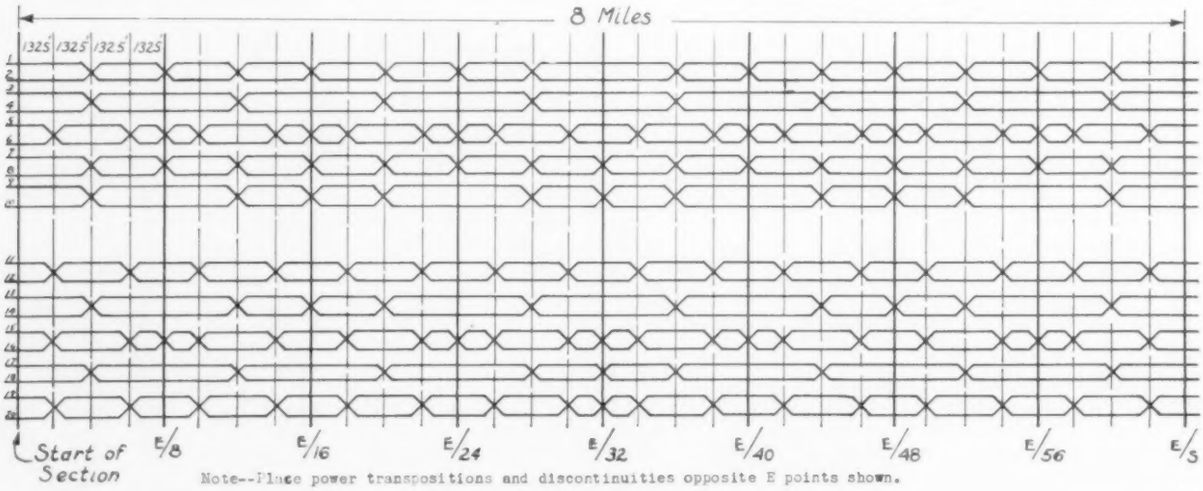
In dealing with an inductive parallel, the engineer must arrange the telephone and power transpositions so that they are *coordinated*. By coordinated, we mean that the relative arrangement and position of transpositions in the power and telephone lines are laid out with respect to each other so as to result in minimum inductive interference. Failure to take into account the proper relationship between the two types of transpositions may result in greater noise than if either telephone or power transpositions were omitted entirely.

Telephone Transposition Design

The design of transposition schemes for telephone lines is extremely complicated, due to the fact that circuits carried on a telephone lead not only have the inductive interference problem to consider but equally important must be transposed so that there is minimum crosstalk between telephone circuits.

If a multiplicity of circuits are carried, as for example on a 40 wire lead, a large number of telephone transpositions placed

(Please turn to page 36)



Note--Place power transpositions and discontinuities opposite E points shown.

Fig. 13—Bell System 8 Mile Tranposition for Exposed Lines

Local Test Desk Operation

PART VI

By C. F. CURTISS

This installment deals with the condenser, its capacities, theory of operation, and method of testing in telephone line circuits.

WHEN a subscriber's line is connected to the test desk for the purpose of test and it is observed that the voltmeter needle kicks over and gradually settles back to zero each time the V. M. and REV. keys are operated, what is known as a ballistic test has been performed. The term "Kick" is applied to a quick, and usually desired throw, that is, movement of a voltmeter needle across the graduated scale. This kick of the needle is due to the testing battery flowing through the voltmeter, out on the line, and charging the subscriber's line conductors and station telephone condenser connected with the line.

Figures 1 A and B illustrate the ballistic effect as indicated by a voltmeter due to charging and discharging a pair of cable conductors. In figure "A" the voltmeter and test battery are connected to the cable pair in such a manner as to cause the voltmeter needle to "kick" across the scale in the direction indicated. When the polority of the test battery is reversed with respect to the cable conductors the charge on the conductors is reversed and the momentary flow of electric current causes the voltmeter needle to "kick" in the opposite direction. The length and size of the cable conductors regulates the amount of charge collected. Consequently, different lengths and size of cable conductors will cause deflections or "Kicks" of the voltmeter needle of different values.

● The condenser in a telephone set is an electrical device which comprises a number of thin sheets of metallic foil, each of which is electrically insulated from the other by thin sheets of insulating material, usually waxed paper.

The action of a condenser is similar to the following analogy: Suppose a long slender glass test tube is suddenly filled with water from another vessel. The vessel on being tilted upwards, rapidly pours the water into the test tube, thereby causing the water level to quickly rise and flow over the top and sides of the tube. Consider another tube of the same size as the other, but having an outlet at one side near the bottom to which is fastened a small deflated rubber balloon. When water is suddenly poured into this tube, instead of flowing over the top and sides of the tube, the water pressure energy is spent in distending the rubber balloon, which as a result becomes strained but does not burst.

● In this manner the rush of the water into the tube is absorbed and thus prevented overflowing. A condenser reacts in a similar way toward an electric current. Like the ballon it becomes strained (electrically) but is able to resist the strain, that is, if it's insulating materials are good, by reason it's large cross sectional area (surface of it's plates of metallic foil) it can provide accommodation for a large quantity of electricity, or in other words, it forms a capacity for the current to flow into. Capacity is a word used to designate the measure of an electrical charge on a plate or other conducting surface capable of receiving and retaining, as manifested by it's ability to retain a certain degree of electrostatic potential and it is a consideration of importance in connection with the construction of telephone line circuits, which involves electrostatic conditions similar to a condenser.

The capacity of a subscriber's station set condenser is it's ability to collect a certain amount of electricity when sub-

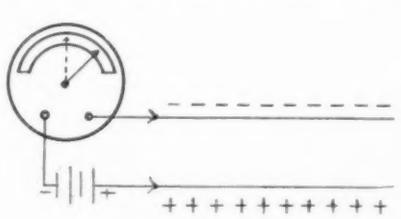


Figure 1A

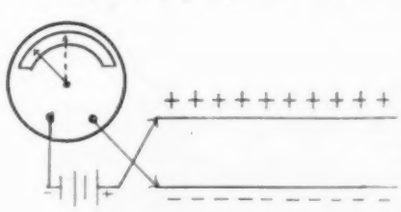


Figure 1B

Note: The Voltmeter Needle Is Shown in Two Positions. The Dotted Line Indicates the Needle at Zero or Rest and the Full Line the Needle "Kicked" across the Meter Scale from Its Position of Rest.

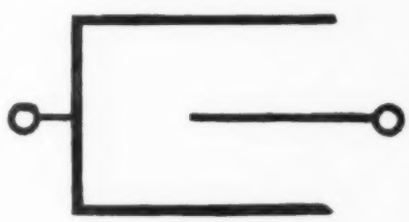


Figure 2

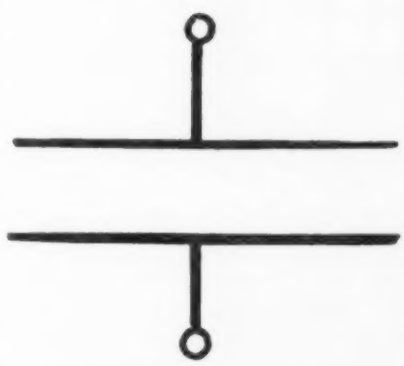


Figure 3

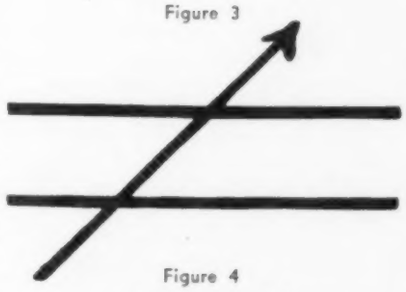


Figure 4

Condenser Symbols

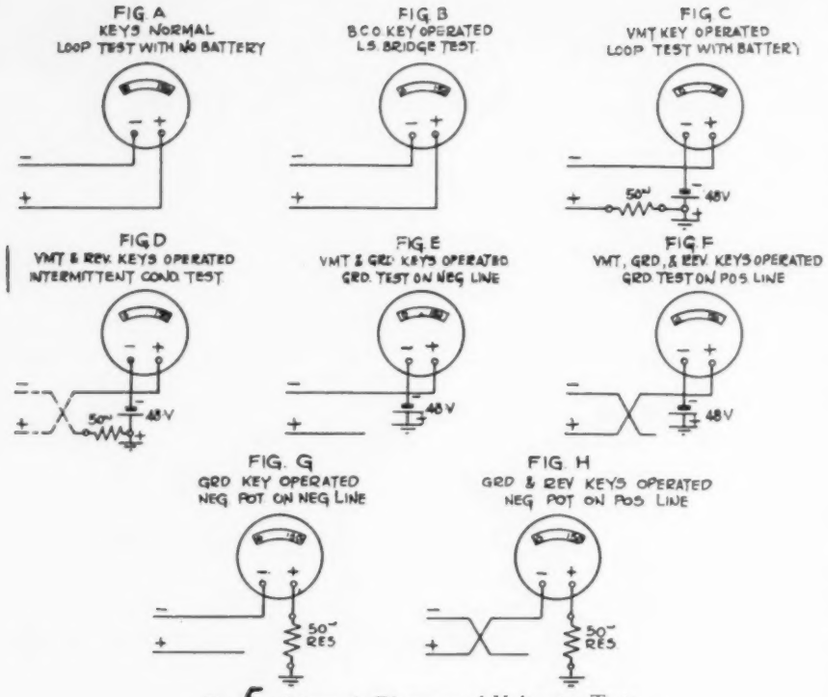


Fig. 5—Schematic Diagrams of Voltmeter Tests.

jected to a given E. M. F. and is governed by the nearness of it's plates, their metallic substance, cross sectional area, and the dielectric. By dielectric is meant any non-conducting substance which separates the plates of a condenser.

The test desk voltmeter is so constructed that the discharge from a condenser will cause a kick of the needle amounting to several scale divisions from which it can readily be determined the capacity in microfarads of the station telephone set condensers. Auxiliary ringers, if conected in series with the ringer of a single party common battery line will cause a slight reduction of the voltmeter needle kick, if connected in series with a separate condenser and bridged across the line the kick will be increased.

● When performing a ballistic test on a telephone line as soon as the condenser in the subscriber's station sets are fully charged, the electric current from the test battery ceases to flow and the test desk voltmeter needle returns to it's zero position. After being charged, the station condenser will discharge the electric current stored therein back through the voltmeter, and can be verified by operating the V. M. key, and then moving the R E V. key back and forth quickly. This will cause the station condenser to alternately charge and discharge and the test desk voltmeter needle will kick over at each reversal of the current flow into the condenser. In this same manner capacity tests of exchange cable conductors and line wires can be made.

Bridged party line stations having the ringers connected in series with the condensers will give an increased kick of the voltmeter needle for each added telephone. Party lines having the ringers connected in series with the condensers to ground on either side of the line will give a kick of the meter needle for the ringers on the L1 or ring side of the line when the R E V. key drops into its normal position, and a kick for the ringers on the L2 or tip side of the line when the R E V key is thrown out of it's normal position.

● A ringer connected in series with a station condenser to ground gives a kick of the voltmeter needle equal to about one half the kick for a bridged ringer. This is due to the fact that in one case the current is measured for both charge and discharge of the condenser, and in the other the current for charge only. Grounded circuit lines will in the same way, give the current for charge only. The distance of a break in a long line having a high degree of insulation may with sufficient practice, be located by means of the local test desk voltmeter needle kick.

To compare the capacity of telephone condensers, it is essential to have a unit for capacity and that which is universally used is called the farad. This is the capacity of a condenser that would be raised to a potential of one volt by a charge of one coulomb of electricity. The coulomb is the unit of quantity of electricity which would pass any given point in a circuit carrying an unvarying current of one ampere in one second.

The practical unit of capacity used in telephone practice is the microfarad or one millionth of a farad. The relation between capacity in farads, potential in volts and quantity is expressed in the following formula: $Q = C\ E$, in which "E" is the voltage applied to the condenser plates, "Q" the amount of charge in coulombs, and "C" the capacity of the condenser in farads. Example: If a test desk battery of 30 volts be applied to a station condenser of one M.F. (microfarad) and a cable conductor capacity of 0.08 M.F. What is the amount of charge? $Q=CE$ or $1.08 \times 30 = 32.4/1000000 = 0.000324$ coulombs.

Other variations of the formula are:

$$C = \frac{Q}{E} \quad \text{and} \quad E = \frac{Q}{C}.$$

● The charge that can be stored up in a condenser or a pair of cable conductors of given capacity is increased by an increase of the applied E.M.F. For instance, if water were compressible, a jar containing exactly one pint of water would represent a pint measure. But if the pressure were increased the water in the jar would be compressed into a bulk and the jar would hold more than a pint. The capacity of the jar remains the same, namely one pint, but the amount of water it will hold will depend on the pressure applied. In the same manner the actual capacity of a condenser is independent of variations of electric pressure, but the amount of charge with any given capacity is proportional to the difference of potential between it's plates and is represented by the formula $Q = C \times E$. One is not to assume from the foregoing statement that a condenser actually stores up electricity, because authorities state "that the operation called charging a condenser merely leaves it under an electric strain which is relieved when it is discharged. It is said to resemble a spiral spring which is suspended from one end and has a weight at the other end. If this spring be pulled still farther down, an ability to do work or a potential is given it. Upon releasing the spring, it contracts, pulls up the weight, and then slightly expands again, causing the weight to jump up and down until the force is exhausted." So in order to avoid complications of words a condenser is said to retain a charge and to permit itself bo be discharged.

● When condensers in a telephone circuit are connected together in parallel the effect is to increase the cross section area, and therefore the resultant or joint capacity is obtained by adding their capacities together. If condensers are connected in series their joint capacities is less than the capacity of the smallest con-

(Please turn to page 38)

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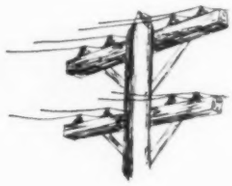


With this issue Telephone Engineer presents a new department devoted especially to long distance telephone communication. We aim to present information which will be of value to both the telephone companies operating toll circuits and other utilities such as the railroads, pipe lines and poyer companies who use long telephone and telegraph circuits, in the operation of their systems.

Introduction By The Editor

The speeding up of business operations during the past few years has necessitated increased useage of communication, both telephone and telegraph. As a result toll circuits have increased enormously in both number and length; today we find telephone circuits extending upwards to 3,000 miles and more. Long circuits such as the above involve telephone repeaters on physical circuits, carrier systems of various types and even radio. Similarly the telegraph art has developed where written messages are needed. Th telegraph printing mechanisms have been perfected to the point where the output of a telegraph circuit has been increased to three times over that obtained formerly with hand Morse. The technical developments involved in long distance communication are many and cover a wide variety of equipment. It is the aim of Telephone Engineer to present information and data which, will be of assistance to all who are involved in the design and maintenance of long communication circuits either telegraph, printer or telephone. In subsequent issues we will present information and circuits obtained from our readers which have proved practical in the field and which will aid in furnishing good communication service. We will greatly appreciate hearing from our readers as to problems they have and where any have been solved in a unique way we would like to obtain the information for publication in these pages.

In order to acquaint our readers with long distance communication over privately owned systems we will open the series with short articles describing the telephone and telegraph systems as found first in the railroads, second in the power companies and third in the pipe lines. Close co-operation by the telephone companies and these private wire utilities will be of benefit to all, the telephone companies will obtain increased revenue, the utilities will obtain better service. It is our aim in the first articles to present the problems involved in communication among the utilities so that we all may assist in giving the best service possible to each other.

Railroad Communication

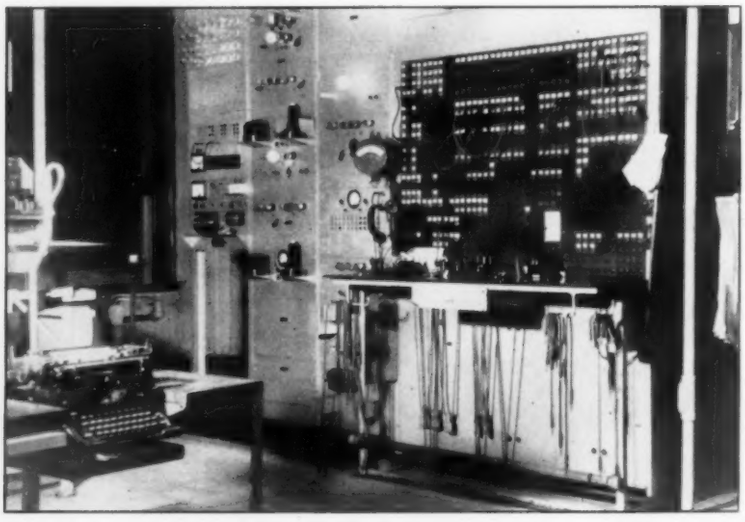


Fig. 1—Typical test board with panel mounted equipment at left.

By C. O. ELLIS

T. & T. Engineer Rock Island Lines

● With the introduction of high speed transportation during the past few years, communication has become an increasingly important part of railroad systems. The facilities employed in this field are a combination of those used by commercial communication companies and are peculiar to railroad requirements; they include trunk morse and printer circuits, division morse and printer circuits, division telephone train dispatching circuits, long distance and local conversation telephone circuits. Diversions, train consists and reports of various kinds, especially those requiring a printed record are best handled by telegraph either hand Morse or printer depending upon the load re-

quirements. Train reservations and information for customers can generally be obtained most conveniently by telephone.

The transmission of diversion orders is one of the most important and essential services furnished by the telegraph, for example: a carload of fruit is shipped from the Imperial Valley; the shipper bills the car to his agent in Chicago but this does not mean that the final destination of the car will be Chicago, for while the car is enroute the shipper will obtain quotations from the various midwest and eastern cities and instruct the railroad to divert the car to the city offering the best price for the fruit. Generally, this diversion order is received a few hours prior to the car reaching the point where it must be diverted. This means that the communication service must be fast and accurate in order that a minimum of delay is had in getting the shipment to its final destination.

● The dispatching of trains by telephone has immeasurably increased the operating efficiency of the railroads and results in economies the value of which would be difficult to estimate; it permits the dispatcher to be in instant communication with any or all parts of his division, in fact it would be difficult to operate a busy division of a railroad without this facility.

The telephone is playing an increasingly important part in the general operation of the railroads; matters which formerly required the exchange of several telegrams can be settled in a few minutes over the long distance telephone circuit. Passenger reservations can be obtained immediately instead of after a delay averaging thirty minutes or longer when handled by telegraph; this prompt handling of reservations creates an impression in the mind of a patron of the efficiency of the railroad services. The long distant telephone is invaluable to the freight traffic department in furnishing information to customers regarding movement and the arrival of cars; it enables a local office to establish direct connection with the central car record bureau and obtain any information desired. With this information, the customer can arrange for his unloading crews to be on hand promptly upon delivery of the car which can be unloaded immediately and released for other services. It is often difficult to justify a conversation telephone circuit only on the basis of dollars and cents saved by its construction; however, there is no way of determining the number of patrons "lost" when reservations are not promptly obtained or other information not furnished with a minimum of delay. The problem is therefore one involving not only direct savings effected by the use of telephone circuits but also potential business which would be lost because of the inadequacy of communication facilities.

Fig. 2—View showing arrangement of printer equipment.

In some cases it is more economical for a railroad to install its own private automatic branch system where traffic is heavy and telephones numerous throughout a congested area such as in large terminals and freight yards where best operating efficiency is obtained by maintaining a system for the exclusive operation of the railroad; this may result in dual installations, however, this plan provides for unrestricted service and leaves the commercial telephones available for service to patrons at all times. In other cases it may prove more economical for the local telephone company to own and lease the equipment to the railroad. The final decision as to the use of railroad owned telephones or those furnished under rental agreements by the telephone company should be reached after careful consideration has been given to the particular requirements and the economies to be effected. If the telephone company can provide the required service at the least cost, such facilities should be used. However if the railroad can furnish service more economically the telephones should naturally be railroad owned.

Figures 1 and 2 show views in a typical telegraph office. Figure 1 shows the test board and rack mounted carrier equipment. This includes a single channel carrier telephone and a two channel carrier telegraph. Figure 2 shows the arrangement of four printers together with multiplex telegraph equipment by means of which two duplex printers may be operated over the d-c or carrier telegraph circuit. The work bench seen in the back ground is for convenience in maintaining the equipment.

The railroad telegraph systems include both hand Morse and printers. Where the messages are less than about 300 per day it is generally most economical to use Morse telegraph circuits. Where the traffic is heavier than this printers are generally justified. Both direct keyboard and tape transmission are used in printer operation depending somewhat on the type of load. Direct keyboard transmission has some advantages in relaying messages taken over the telephone or from telegraph wires. Where the traffic is heavy tape sending is generally more econical than direct keyboard as an operator can punch tape much faster than the printer will transmit over the line. At present the maximum practical speed for a printer is about 60 per minute. Tape can be cut at the rate of about 80 or 90 words per minute. Thus one operator, can take care of several machines during light periods of operation.

Where a large number of messages are relayed from one printer circuit to another the use of a reperforator is justified. This device operating in conjunction with the receiving printer perforates a tape which is placed in the transmitting unit on the circuit over which the messages are to be routed thus eliminating delay and the labor otherwise necessary to retransmit the messages.

Most printer circuits are operated duplex that is, transmission in both directions may be had at the same time; the standard duplex circuits are used for the d-c type transmission. In the past, composited telephone circuits have not been very satisfactory for printer operation. However, recently developed composite sets appear to be much better in this respect than the type commonly used. Carrier current systems furnish an economical and reliable method of obtaining increased telegraph communication without the necessity of stringing additional wire. In fact, it

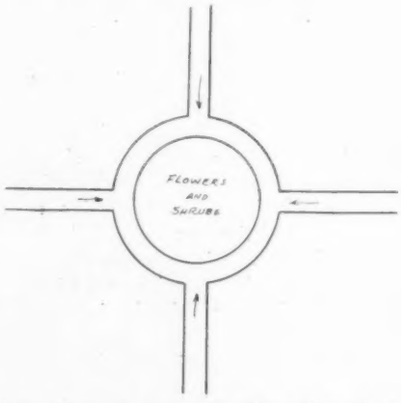
(Please turn to page 41)

A Terminal Pole in Belgium

A Pioneer Reports On Europe

We are indebted to P. Kerr Higgins, pioneer telephone man, for this very interesting discourse covering the auto tour of Europe enjoyed this summer accompanied by Mrs. Higgins.

● There is little doubt the regime has done wonders, such as making a United Germany, enforced respect for law and greatly improved living conditions, built magnificent highways and by making synthetic substitutes, made itself independent of outside help. Science is supreme in Germany today beyond the dreams of the Spartans. As we travel on, we passed Villas set in gardens, cafes on sidewalks and in pateos, resting places along the sidewalks under beautiful trees,—everything giving the impression of contentment, if not happiness. We passed old castles, monuments, streets old and modern, but no signs of extreme poverty. Potsdam intrigued us and while there we chose the Palais Hotel, which is beautifully located, meals being served on a veranda overlooking a beautiful and interesting city. As in other cities, public parking places are provided by the City, with a caretaker, for a very nominal sum. Public Garages charge from 25c to 50c per night, with a much lower rate by the week. The next day we visited the splendid Government buildings, the castle, etc., in Sanssouci Park. The tour through the Park cannot be described in words. The formal gardens have perhaps no equal. Here we commenced to note the bald heads of nearly all middle-aged men. Some claimed this was due to the continued use of metal helmets during the war, but others denied this, but offered no other reason. In the smaller towns, we also noted a shortage of butter, except at the best hotels. It was with deep regret that we left Potsdam, and as we did so we were held up by a policeman, who had a hard time trying to tell us that we must pull into the curb and wait until 10:30 a.m. as a Hitler Youth Parade was due to pass over that highway. The scene was somewhat amusing, but might have been serious there in Germany. Everywhere in Germany citizens salute each other with "Heil Hitler" instead of the time of day. Not to do this might cause trouble, for in this country when one is put in prison, the key is thrown away—at least it seems that way. There is therefore great respect for the law and its representatives. We ran into another humorous situation in Berlin. The road sign we passed said "6 Km. to Berlin," but did not indicate any special road. We showed them our maps, phrases in German in our guide book, etc., and emphasized many times the fact that we wanted to get to Berlin, BERLIN! BERLIN!! With this sign "6 Km. Berlin" we thought we were in a suburb and wanted to get into Berlin proper.



Very Common European "Roundabout" to curb traffic in cities and on roads.

● Finally after looking each other and then at us and at our maps and guide books, one officer said to our amazement, in broken German "This is Berlin." It seems that all distances are measured from Government owned railroad stations and we were six kilometers from the station. Later we ran into a detour "Leitung" and we went around and round. Finally we hailed a man with a repair car and after a hard time, he understands what we want, says by beaconing "Follow us," gets in his car, takes us about two miles to our destination and sails off before we can even thank him,—only a wave of the hand to say "Goodbye and good luck." Such courtesies are every day occurrences in Germany.

Berlin is a very fascinating, interesting and varied city. It is very beautiful. Here one can find almost any form of entertainment. For seventy-five cents one can have a bottle of wine and an evening of dancing at an up-to-date cafe. The Eden Roof Garden is most popular. There are fine gardens, museums, galleries and beautiful buildings. Americans frequently go to the "Cascade"; also Resi's, the place of a thousand lamps. Here you can see the real Berlin. The main street is "Unter der Linden" (Under the Limes), but the lovely trees which we had hoped to see were not there; they had been taken out and new trees have

(Please turn to page 40)

Wire Rope and Strand

now products of Bethlehem

WITH the recently-announced acquisition of Williamsport Wire Rope Company by Bethlehem Steel Company, Bethlehem becomes a manufacturer of wire rope and strand.

For years the name Williamsport has been identified with dependable wire rope and strand. Not only to men who have been using Williamsport products, but to all other wire rope and strand users, Bethlehem's entry into this field marks an important forward step.

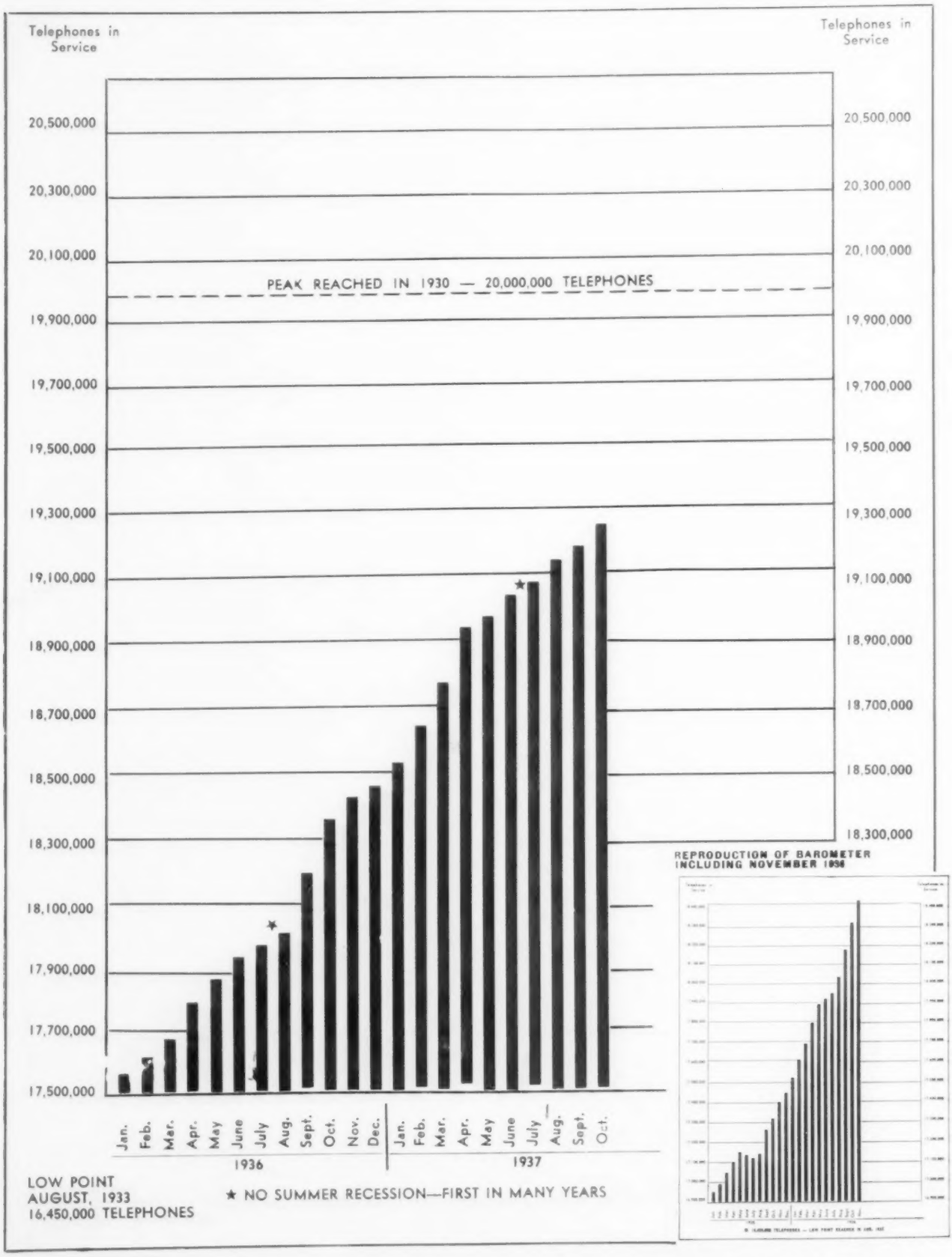
As Williamsport Wire Rope becomes Bethlehem Wire Rope, customers of Williamsport Wire Rope Company can look with assurance to Bethlehem to maintain the quality standards associated with Williamsport products. Advantages to the user may naturally be expected to accrue from the broader manufacturing and servicing facilities offered by the Bethlehem organization.

Customers of Bethlehem Steel Company can now obtain a complete line of wire rope and strand from the same source which furnishes their other steel requirements, and made to the same quality standards as those that govern in the manufacture of Bethlehem alloy and tool steels, plates, sheets, and other products.

Wherever and however you use wire rope and strand you will find Bethlehem a source of well-made, dependable material, serviced by men whose long, first-hand experience in analyzing and solving wire-rope problems is a background for authoritative recommendations on the most suitable grade of Bethlehem Wire Rope for any task.

BETHLEHEM STEEL COMPANY

Monthly Telephone Station Barometer



REPRODUCTION OF BAROMETER INCLUDING NOVEMBER 1936

"Tapping In" On Washington

(Continued from page 19)

Chairman also has inaugurated a system of sending weekly statements of the Commission's actions and pending applications to the members of Congress, the state governors and the state commissions.

New Transatlantic Telephone Circuits To Europe

The American Telephone and Telegraph Company can now launch its program of new direct transatlantic radiotelephone service between the United States and three Continental European nations of Germany, Italy and Switzerland as the result of a recent approval of its plan by the FCC, which had studied the project for two months after lengthy hearings last August. The Commission also authorized the settitng up of an experimental radiotelephone circuit to Moscow so the A. T. & T. can test out service between the United States and Russia.

The establishment of the direct radiotelephone circuits to Germany, Italy and Switzerland means that the United States now has five direct channels to as many European nations, because the A. T. & T. already is operating its transatlantic radiotelephone service to England and France. If the radiotelephone tests to telephone connection between the United Russsia prove successful, it means the first telephone connection between the States and the Soviet, because up to the present there have always been great difficulties in the establishment of land wire routes across Europe to Russia to be connected with the radiotelephone circuits between the United States and England or France.

Another new transoceanic radiotelephone route was also approved by the Commission. This will be a linking of Hawaii and Japan by radiotelephone. RCA Communications Inc. will operate the service, while the Mutual Telephone Company of Hawaii operates the telephone system of the Hawaiian islands.

Haiti Phone Service Started

Haiti was added to America's telephone directory Sept. 29, with an exchange of greetings between Secretary of State Cordell Hull in Washington and August Turnier, acting secretary of foreign relations for Haiti, in Port au Prince. The service is handled over a short wave radio telephone circuit between American Telephone and Telegraph Company stations at Miami and stations of the West Indian Telephone Company near Port au Prince.

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LAWRENCEVILLE, ILLINOIS

LINE and DESK

RAY BLAIN, Member A. I. E. E., Editor

Q. What is the impedance coil method of battery feed in common battery telephone service?

A. The Impedance coils offers comparatively low resistance to the steady battery current fed out to the lines, but due to their reactance they present high impedance to the passing of voice currents through the bridge. Briefly this principle while permitting free passing of direct current to the lines, has very little shunting effect to the voice currents.

Q. Is there available a set of tools in a case which are considered suitable for a local troubleman to carry on the job?

A. Such a case can be obtained which is constructed of leather and contains all the necessary tools the average troubleman will ever need on the job in the way of small tools. The tool content of this kit may be varied but they usually contain two pair of pliers, screw driver, knife, file and tweezers. These cases can be purchased from any telephone supply house.

Q. Should ducts be sealed where they enter a manhole?

A. Ordinarily not as one purpose of a manhole is to drain the conduit sections. When ducts connect direct with basements or cable vaults they should ordinarily be sealed on each end. In this case ducts should be sealed whether in use or vacant. Plugs can be used to seal vacant ducts and a good duct sealing compound used to close ducts which have cable in them.

Q. What method may be used to advantage in removing dirt and dust from delicate central office equiment?

A. The hand bellows is the method most frequently used though small portable electric operated blowers are now used to some extent. The one difficulty with a blower is that it may force dust into equipment and cause trouble. The vacuum cleaner is probably best for cleaning all delicate telephone equipment. Special vacuum cleaners designed for telephone use can be purchased at a reasonable cost.

Q. In relay adjustment what is meant by contact follow, contact pressure, and contact separation?

A. Contact follow is the distance a contact on a spring travels after it engages the contact on a traveling spring. This insures a good electrical circuit through the contacts of the relay. Contact pressure is the force exerted between contact springs of a relay. Contact separation is the clearance between any pair of normally open or any pair of contacts which are separated on operation of the relay.

Q. What type pump can be best used to remove water from manholes?

A. Various type hand pumps can be used to advantage. Most telephone companies who utilize hand pumps prefer the bilge type made from sheet metal. This pump is light in weight and fast in operation. Numerous gasoline engine operated power pumps are also available for manhole use. These pumps are often conveniently mounted on trailers or trucks. The electric operated pump is now extensively used for manhole work where power can be obtained by utilizing long extension cords.

Safety Bulletin

The necessity of keeping one's own crew "Sold" on the merits and worthiness of the Telephone Company's Safety Campaign and it's expected results—Prevention of Accidents—is one of the real problems of the line foreman's management. There is a deep psychological truth back of the expression "He Can, who Knows He Can," and in another, "The Man Who Is Armed with Belief Is Doubly Armed." If the foreman believes in the safety idea, he will convey that belief to others, particularly his crew.

Q. What method is considered best to terminate lead covered, paper insulated, cable inside buildings?

A. The old method and the one probably most generally used is to place a piece of Silk and Cotton, lead covered cable to the paper cable and then fan this out on a house terminal. A more recent method, and one we consider an improvement, is to splice a sealed chamber binding post terminal to the paper cable direct. This method is convenient to use and provides a moisture proof seal to all cable inside the building. Various types of sealed chamber terminals can be purchased at a reasonable cost.

Q. The verticals on our main frame each contain 160 pairs of protectors. We are now rebuilding and would be pleased to know whether this arrangement should be continued or should we change to a more standard arrangement?

A. The main frame with only 160 pair of protectors on the vertical side is generally considered non-standard at the present time. In cabling such a frame, it is necessary to either run one 200 pair or two 100 pair cable to each vertical. Then the 40 extra pair are either lost or must be carried across to the next vertical which makes a finished job anything but neat. In our opinion each vertical should contain either 100 or 200 pair of protectors. This makes cabling convenient and a much better arrangement in the cable vault. It would probably be possible to remodel your present main frame by either removing 60 pair of protectors from each vertical or adding 40 pair to each.

Q. Is the wall type main frame considered best for use in the small exchange?

A. A wall type main frame is generally considered satisfactory for the small exchange of not over about 200 or 300 outside cable pairs. This type frame is not quite as convenient to work on but neither does it require as much space in a small office where room is often at a premium.

Q. Where a cable form is attached to the iron work on a main frame should it be protected with friction tape?

A. Tape protection is in most cases unsightly and generally not considered necessary. When the iron is well covered with aluminum paint to prevent rust protection such a tape is not ordinarily considered necessary. When some protection is considered necessary, we suggest that a thin strip of wood or fibre be placed between the cable form and the iron work of the frame. This is a most neat and safe arrangement.

NOTE: Readers desiring to send questions for this department should address, Line & Desk, % Telephone Engineer, 185 N. Wabash Ave., Chicago. All questions answered FREE.

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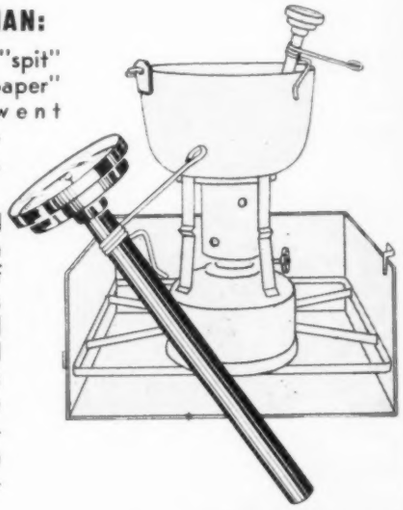
MR. CABLEMAN:

The days of "spit" and "charred paper" thermometers went out with grandmaws bustle. . .



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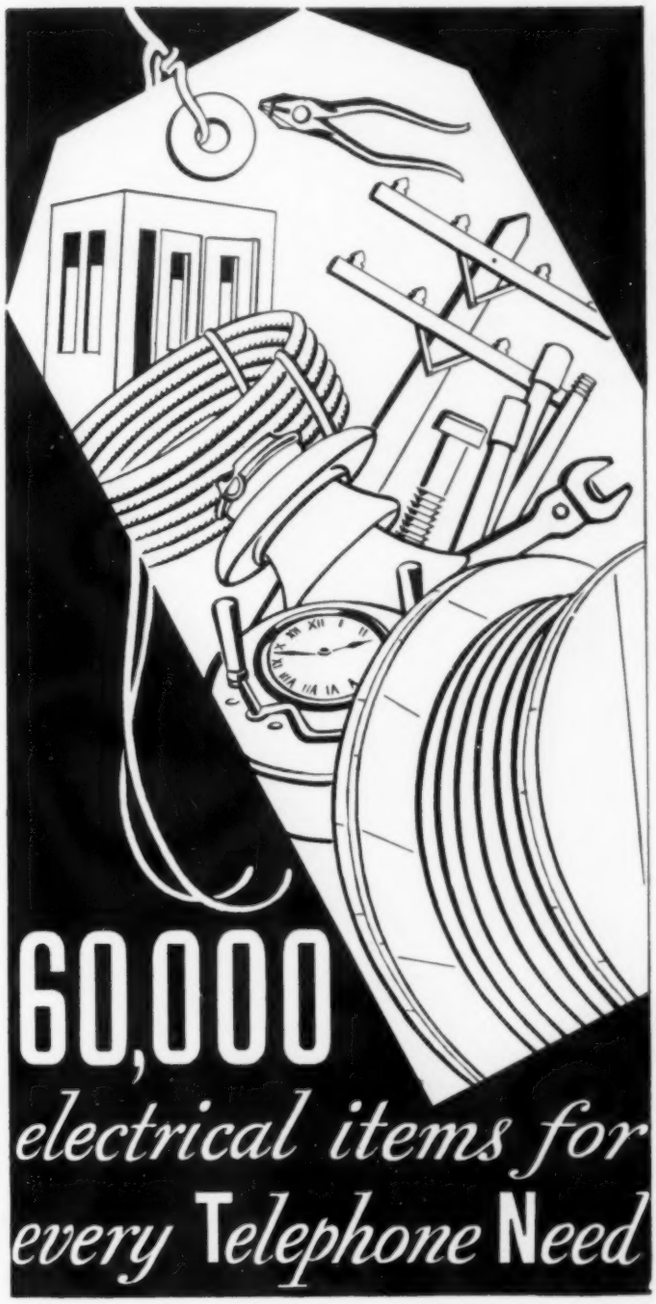

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OFFICES IN 83 PRINCIPAL CITIES. EXECUTIVE OFFICES: GRAYBAR BLDG., N.Y.

A DEPENDABLE
CABLE
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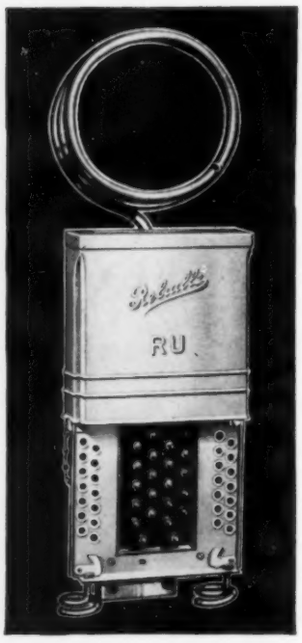

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Type RU unprotected terminals are easy to install, easy to work on and built to outlast the cable.

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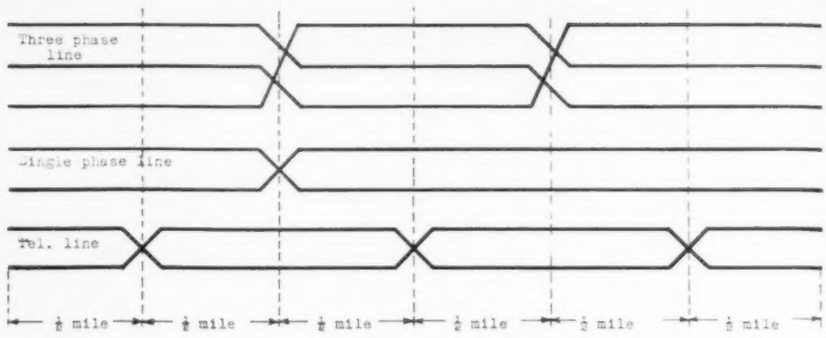

Fig. 15—Principals of Transition Co-ordination.

Minimizing Inductive Interference

(Continued from page 22)

at frequent intervals are required to provide complete freedom from *crosstalk* between all of the various circuits.

Systems of telephone transpositions are available and are applied in what are termed *transposition sections* of various lengths, but generally 8 miles, 4 miles, 1½ miles, or ½ mile sections.

Exposed Line Design of Bell System

Some types of transposition sections are not suitable for coordination with power lines. These were developed in the days when there was little known about inductive interference and while they served fairly satisfactorily from a crosstalk standpoint, they were not suitable where long and important parallels were involved.

The Bell Telephone Company early recognizing the need for an improved type of transposition section undertook and accomplished the design of a system of transpositions which provided both an excellent crosstalk and inductive interference balance. These systems of transpositions were designed for various lengths from ½ to 8 miles and became known as the *exposed line systems* because of the fact that they were designed to work on telephone lines exposed to power lines. This system of transpositions was described in the inductive interference report No. 66 published by the Railway Commission of the State of California in 1919. Also in a very excellent article by H. S. Osborne (Bell Telephone System) published in the July 1918 issue of the proceedings of the American Institute of Electrical Engineers. A vast amount of research work was necessary in developing the exposed line transposition schemes and the successful solving of the transposition problem on multi-wire telephone leads is a tribute to the exhaustive efforts of the Bell Telephone System in providing the best possible world-wide facilities for telephone communication. Several of the Bell System exposed line sections are shown in figure 13 and 14. In order to simplify the illustrations only the first two arms are shown.

Balance Points in the Telephone Transportation Scheme.

In referring to these diagrams, it will be observed that they are so designed that there are specific locations in the section shown in Figure 13, which are referred to as *eighth points*. It is opposite these points that *discontinuities* in the power line such as load taps, transpositions, etc., must fall. By coordinating power transpositions and discontinuities so that they fall opposite these specified

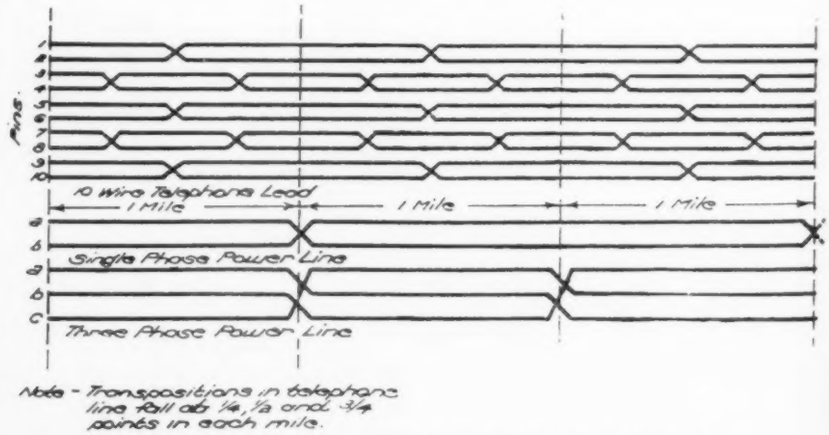
Ans.
10 Wire Telephone Lead
1 Mile
1 Mile
1 Mile
Single Phase Power Line
Three Phase Power Line
Note - Transpositions in telephone line fall at ¼, ½ and ¾ points in each mile.

Fig. 16—Simple Transposition Scheme suitable for 10-wire Rural Leads.

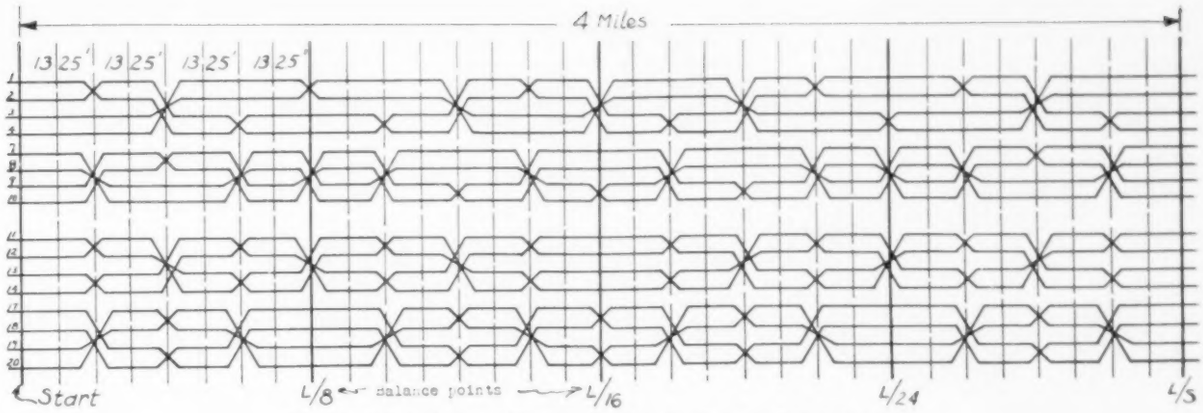

Fig. 14—Bell System 4 Mile Transposition Section for Exposed Lines

points in a telephone transposition system, the maximum degree of inductive balance between the power and telephone line is obtained. Failure to locate discontinuities at these balance points in the telephone transposition scheme results in ineffective neutralization and equalization of the potentials induced in the telephone circuits.

On three phase power lines transposition barrels three miles in length coordinate best with exposed line schemes.

Single phase lines transposed every other mile will coordinate nicely with the eight mile barrel.

Simple Transportation Arrangements

Where power lines are involved in exposures with only one or two telephone circuits, the matter of transposition coordination is relatively simple involving merely the placing of telephone transpositions so that they create a balanced section with respect to the untransposed portions of the power line.

This is shown in Figure 15, which shows one two-wire telephone line paralleling both a three phase and a single phase power line. It will be observed that the telephone transposition is placed at the midpoint of each untransposed section of power line, whereas the power transposition occurs at what might be termed the "transposition balance point" in the telephone line. A section of telephone line may be said to be balanced if there is an equal length of circuit on each side of the transposition point.

Simple 10-Wire Transposition Scheme.

A simple well coordinated transposition scheme for a ten wire telephone lead has been worked out and is shown in Fig. 16. The scheme shown provides a fair crosstalk balance between all *closely adjacent* cricuits on the telephone lead and at the same time a good inductive interference balance to power lines.

If the scheme shown in Fig. 16 is to be used and the power line is already transposed at other than mile points, the transposition section should be shortened or lengthened so that the junction points, marked X, fall at either power transposition points or at the end of the power transposition barrel.

(To Be Continued)

Bell Executive Convalescing

Floyd O. Hale, president of the Illinois Bell Telephone company, is in a hospital at New Haven, where he was taken after a collapse during the exciting Yale-Dartmouth game on October 30, which ended in a 9-9 tie.

Christmas Seals
are here again!
They protect your home
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INDIANA STEEL & WIRE CO.
Muncie, - - Indiana

Local Test Desk Operation

(Continued from page 24)

denser in the group. The joint capacities of condensers in series is calculated in the same manner as the joint resistance of a group of resistances connected in parallel, that is, the total capacity equals the sum of the reciprocals of the individual capacities, that is, the joint capacity is equal to the product of the respective capacities divided by their sum. Example; Three condensers of 0.2, 0.4, and 0.6 M.F. are connected in series what is the joint capacity? $\frac{1}{C}$ or $\frac{1}{0.2}+\frac{1}{0.4}+\frac{1}{0.6}=\frac{11}{1.2}$ hence the joint capacity equals $\frac{1.2}{11}$ or 0.109 M.F. the capacity of the condensers connected in series is thus less than that of a single condenser of the group. All open wire line conductors and cable conductors used in a telephone system act as condensers, the conductors forming one plate, the air in case of the open wire and the insulation on the cable conductors acting as the dielectric and the other conductor of a cable pair forming the other plate.

Increasing the length of a cable increases the area of the plates formed by the conductors, the effect being similar to that of condensers connected in parallel, consequently, the capacity per mile of a telephone cable, and of open wire also, is equal to it's total capacity divided by it's length in feet or miles. For example, an exchange cable six miles long has a capacity of 0.498 M. F. what is it's capacity per mile. By formula: C. P. M$=\frac{T\ C}{L}$, in which "C. P. M." equals capacity per mile, "T C" total capacity, and "L" length of cable, therefore,

C.P.M.$=\frac{T\ C}{L}$ or $0.498/6=0.083$ M. F. per mile.

Other problems. (1) A subscriber's line circuit and station set containing a 2 M.F. condenser are connected in series with a 100 volt test battery and 100000 ohm voltmeter and a deflection of the meter needle across the scale of 89 divisions is obtained. What is the capacity of a condenser and line circuit which produces a deflection of 45 divisions? $2:\times::89:45$ in which $\times\ \frac{2\times 45}{89}=$ 1.011 M.F.

● Capacity often exists in a telephone circuit in such a way as to interfere with telephonic transmission. Such is the case in telephone cables, and to a lesser extent in an open wire line where two wires of a pair form the conductors of a condenser, and either the paper insulation covering on the cable conductors or the air surrounding the bare line wire acts as the dielectric. Since the capacity in this case is distributed uniformly along the line the action becomes very complicated, and perhaps can be best understood by likening the circuit to one in which a large number of very small condensers are bridged across the line with a certain amount of line wire resistance between them. The effect of this widely distributed capacity is to cause an absorption of current in the portion of the line nearest the source of E.M.F., so that less current is received at the far end than is delivered to the line. This effect is especially noticeable with electric currents of voice frequencies. Opens in a telephone line circuit can often be localized by measuring the electrostatic capacities of the severed portion of the line wires respectively to ground, and will be proportional to their length. By dividing the results of the measurement by the known capacity of the conductor per mile, the approximate distance to the fault or open will be obtained.

● Figure 5 represents a schematic diagram of several of the tests that can be made by means of the Automatic Electric Company Type 21 testing turret. Figure "A" shows method of performing a subscriber's loop test with the test battery disconnected. Figure "B" lines test, no test battery. Figure "C" loop test. Figure "D" station capacity test. Figure "E and F" ground test. Figure "G and H" difference of potential test.

Figures 2 and 3 illustrate two common symbols used to designate a condenser on a circuit drawing. Figure 4 represents an adjustable condenser, that is, a condenser containing variable capacitance as indicated by the arrow.

Fred M. Hoag Retires

Announcing his retirement after 40 years active service in the telephone industry, Fred M. Hoag, St. Louis, vice-president of the Southwestern Bell Telephone Co. in charge of commercial department matters, will move with Mrs. Hoag to San Antonio, Texas to make their home.

His service with the industry started as cable helper with the Cleveland Telephone Company just before the turn of the century. Moving to Texas in 1903 after joining the engineering department of the Southwestern Bell, his subsequent career had its culmination in that territory with his elevation to general manager for Texas for 5 years, from 1921 to 1926. Being appointed general commercial manager and 2 years later, vice president, his past years have been spent in St. Louis.

POTOSI "SILVEROOF"

An Important Announcement by Potosi Tie and Lumber Company

ON NEXT PAGE

POTOSI "SILVEROOF"

Showmanship

(Continued from page 20)

salesman a chance to be in the spotlight. Smart training directors use the same technique in instructing operators. They pass out mimeographed sheets listing fifty statements about emergency calls, unruly callers, etc.—ask operators to mark every statement with a Yes or a No. Bringing the operators into the game as a participant will double her interest.

Self interest will bring thousands of women into your next prize contest—if they think they have a chance to win. The Franklin Society, New York Savings Bank, offered prizes for the best group of twenty-five listings, taken from the New York Telephone directory, of namesakes of famous Americans, dead more than fifty years.

Major Bowes' "Amateur Hour" network broadcast has in the past two years pulled more than two and one-half million telephone calls. Why? Because the spotlight is not on the entertainers but on the listeners who are the high and mighty judges. One telephone company has a Hall of Fame for all salesmen who have scored 100% or better of the quote for he yeae. Every month the picteues are ranked according to the previous month's record. It gets the salesmen working both to get in and to stay there.

Illustrations of happy, healthy people will lead readers of your ads to put *themselves* into your ads. Thus selling *themselves*.

One telephone company sent investigators out to ask 30,000 women: "How can we improve our service?" Immediately the entire community was complimented by the fact that a large company should come to them for advice.

Sell others the idea of making their customers the hero. "Pop" Flash in the Gas Age Record suggests as one selling stunt for dealers a direct mail letter reading: "Dear Mrs. Blank: We know your phone number is ———, but do you know ours, etc." Knowing that a telegram makes the receiver feel far more important than a stereotyped letter. The Loudborough Oil Co., of Washington, D. C., sent telegrams to their prospeits with cards inside to be filled in. 3,500 prospects received telegrams; 175 filled in the cards and returned them. While 66 bought,—an unusually large percentage for this field. Oliver Martin, editor of the Transmitter suggests making all telephone employees heroes by giving them label buttons to wear. The buttons to resemble phone dials and to bear the proud greeting: "Hello, Brother Bell!"

Though reaching for a laugh, Joe Cook reflected an important basic point of view when he said:

"Of all my wife's relations, I like myself the best."

Potosi "Silveroof"

poles are seasoned in the dry, prairie climate before final inspection and treatment, insuring minimum checking.
They are treated at relatively low pressure with pure No. 1 A. W. P. A. creosote oil, obtaining deep, uniform penetration with unusually clean exterior.

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as Exclusive Distributors to the Independent Telephone Industry for our well known

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Highest Quality Poles with Immediate Shipments on all standard items.

Fill out and return the following coupon now. There is no obligation whatever.

LEICH SALES CORPORATION,
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Please quote us prices on the following sizes of POTOSI "SILVEROOF" Poles.

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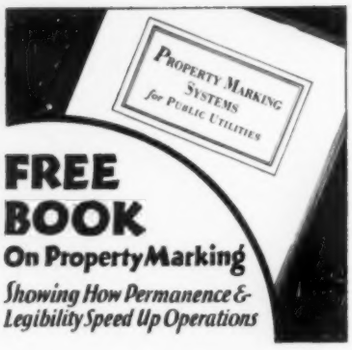
City ..... State .....

By .....



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On Property Marking
Showing How Permanence & Legibility Speed Up Operations

The systematic marking of all poles and other structures for cost checking and for quick identification is now an accepted practice with utilities everywhere. State regulations demand that such markings must be legible and enduring. The old idea of paint pot and stencil has been rendered obsolete by PREMAX METAL MARKERS. Not only is the first cost lower, but all necessity for periodical renewal is absolutely eliminated.

Use Premax For Every Job of Identification

PREMAX MARKERS for poles, transmission lines, outlet boxes, terminals, etc., may be had in standard or special designs. PREMAX LETTERS AND FIGURES of embossed brass or aluminum are available in a wide range of styles in 1/2 to 6-inch heights. Embossed aluminum POLE TAGS are available in any design with 1/2 to 1 1/4-inch letters, any length.

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Send today for FREE booklet "Property Marking for Public Utilities," together with samples. Learn how economically you can mark an entire system. Once you use PREMAX MARKERS, the job is done for all time.

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Division of Chisholm-Ryder Co., Inc.
3812 Highland Ave. Niagara Falls, N. Y.

A Pioneer Reports on Europe

(Continued from page 30)

taken their places. This is Berlin's finest shopping district. Here one is deeply impressed with the German youth, Spartanlike in their recreation suits, a wonderful contrast with the youth of most other countries, they reflect fresh vitality at its best.

● Between Berlin and Pitsdam, there are many wonderful week-end places, as "Schloss Marquardt," just a little way out of Berlin. Then too Potsdam is a great favorite and has a definite allure with its beautiful palaces and grounds of Sanstouci and Fredric the Great, all living in the splendor of a historic past. Too the great Spa of Waunsee is a great attraction on hot days. We find that gasoline sells at forty cents a gallon or ten cents a litre (slightly more than a quart) and oil was about 8c a qt. German mechanics do excellent work and are very reasonable in price. All roads are well marked except in cities where the tourist soon gets lost without his maps or guide.

We were fortunate in securing Tourist Registered marks before entering Germany, for while we paid 26c (plus) for these, they charged us 40c per mark in Germany for changing Travelers checks plus a small tax. The registered marks can be bought through banks, the American Express, Travel Bureaus or Steamship Agencies and are exchanged in Germany to regular German Currency. These can be used for personal needs, automobile, hotel, etc., up to fifty marks per day per person through a bank. These exchanges are entered upon your passport.

● After delightful days in Berlin, we leave for Wittenburg, the home of Luther, the Reformer, who nailed his world famous thesis on the door of the Castle Church in 1517. In Wittenburg, the points of interest are the "Market Square," the home of Luther's parents, Luther's home, ancient University, Luther's pulpit and monuments, Quadrum of the Cloisters, burying place of the monks. The town was founded in 1180, was strongly fortified early in the 18th century and had been occupied by the French. The population numbers 25,000. Eight hundred years of town history and four hundred years of the history of the Lutheran faith greet the vistor at every turn.

Our next stop is Leipzig, a very beautiful city and full of life. It has a population of over 700,000 and is world famous for its street fairs and commerce. The fair buildings are very fine. This is the seat of the Reich Law Court (Supreme Court), an important musical center, the largest railroad station in Europe, beautiful gardens and sport centers. We found the roads still splendid and well shaded as we passed on to Dresden, the capital of Saxony, one of the finest cities in Germany with a population of 632,000. This city is noted for its fine art galleries, splendid buildings, gardens and statuary and is the home of Dresden China.

● Upon reaching Dresden, we asked a young man for directions to the Deutscher Hof. After trying hard to make us understand, he pointed to an approaching street car and told us to follow it. We started to follow and to our surprise he boarded this same car. We followed for about a mile, when we saw the young man get off the car and wave us to stop. This we did, and he pointed to the left where we could see the word "Deutscher Hoff" in large letters; and before we could even attempt to thank him, he had boarded another car back in the direction from which he came. Such was German kindness to tourists and it was very common all over Germany.

American Monument to "Our Dead" —Verdun

Telephone line construction all over Europe is still for behind America. We frequently saw what seemed to be "Human Wire Reels"—reels on the backs or breasts of men in Germany reeling off wire to other workmen on high poles. While we saw a few eight-pin iron cross arms and pins, the use of the ten-pin wooden arm and pins is very rare and hence poles are much taller than necessary.

(To Be Continued)

Long Lines

(Continued from page 29)

now appears that the use of carrier will permit the reduction of wire load on many lines. The economies which will result from such line reduction offer very promising possibilities.

The development of long distance telephone communication on most railroads is relatively new. However, many miles of telephone circuits are now being added each year. These are often obtained by transposing existing telegraph wires thereby providing facilities for both physical and phantom telephone circuits as well as carrier. In general, the practice has been to phantom transpose four wires using one side circuit for telephone train dispatching, the other side circuit for local message business and the phantom for long distance message business. Where additional facilities are needed carrier can be superimposed on each side circuit to obtain several telephone or telegraph circuits as required.

We may look forward in the future to both an increase in printing telegraph and long distance telephone circuits. As the traffic load increases printers become justified in place of the old hand Morse. The economies of the long distance telephone are just beginning to be appreciated and this service will undoubtedly increase very rapidly in the future.

Francis A. Bowdle Succumbs To Stroke

Frances A. Bowdle, 64, Wheaton, Illinois, long time independent telephone operating man and later head of an accounting system that numbered many Independent telephone companies as its customers, died at Elmhurst, (Ill.) Community Hospital, November 10, of a complication of heart and kidney trouble following a stroke suffered while attending the United States Independent Telephone Association annual convention in Chicago during October. Funeral services were held in the Presbyterian Church of Bement, Ill., and conducted by Rev. William Anderson, assisted by Rev. Royal W. Ennis, Cerro Gorda, Ill.

The news of his passing was a distinct shock to his many friends whom he greeted while at the convention and who were unaware of the stroke that 4 weeks later resulted in his death. Of a jovial nature, an ardent church worker, and the father of three sons, we of TELEPHONE ENGINEER join with the telephone industry and his survivors the loss we have all suffered. Until recently Mr. Bowdle was a member of our board of directors and his close association meant much to this organization.

Being associated with the telephone industry the greater part of his life, his very early days were spent on the farm. He was manager of the Cerro, Gorda exchange for many years beside operating other companies in Illinois. Selling his exchanges a few years ago, he then devoted his entire time to his accounting business for which he had devised a system of accounting for telephone and electric companies which became known and used extensively throughout the country.

Surving are his widow, and 3 sons, William H. of Chicago; Donald O. of Wheaton and Paul H. of Boston; and one sister, Mrs. L. W. Wise, of Watseka, Ill.

The accounting business that Mr. Bowdle founded will be continued under the guidance of his son, Donald O. Bowdle, who has been assisting his father in the business the past few years.

May We Apologize?

This, the November issue, is late because of strike at our printers, The Morton Printing Company.

...MEN IN THE MAJOR LEAGUES

Those men every community regards as leaders . . . in turn demand similar superior performance. In Chicago these men find at The Stevens the atmosphere . . . the comfort they demand of a hotel. That's the reason they call The Stevens, "America's Grand Hotel." Their strongest endorsements are their repeated autographs on our register.

OTTO K. EITEL, *Managing Director*

STEVENS
"America's Grand Hotel"
CHICAGO

Room, with Bath, from $3

SUB-CYCLE
RINGING SERVICE AT ITS BEST!

The MASTER Ringing Converter

- No Radio Interference
- No Vibrating Contacts
- No Adjustments
- No Rectifiers
- No Vacuum Tubes
- Reverting Tone Feature
- Economical
- Reliable

PRICE, $45.00
Equipt with Pulsator for Biased Ringing $55.00
1 MONTH FREE TRIAL At our Risk

Output 20 Watts, 90 Volts Operates on 110 Volts A.C.

LORAIN PRODUCTS CORPORATION, LORAIN, OHIO
Lorain Products Corporation is exclusive manufacturer for use and sale in United States. Address foreign inquiries to Automatic Electric Sales Co., Ltd., Chicago, Ill. Sold by Leading Distributors.

N. E. M. A. Elects P. W. Conrad to Board

At the meeting of the Board of Governors of the National Electrical Manufacturers' Association, held on October 27, Mr. P. W. Conrad, president of Automatic Electric Company, was elected a member of the board to fill the vacancy left by the death of Mr. H. L. Harris, and to serve during the unexpired portion of the three year term ending with the annual meeting of 1939.

Mr. Conrad, who a few weeks back was elected president of Automatic Electric Company to succeed Mr. Harris, has been associated with the Automatic organization for several years. He began his career with the Company with various special promotional assignments, both in the United States and abroad, later becoming commercial vice president with headquarters in Chicago. During the years he has steadily expanded his scope of activity, until now, as president, he has general direction of the entire Automatic organization, as well as of its principal distributing companies.

P. W. Conrad

From the time the National Electrical Manufacturers' Association was formed, the Automatic company has been actively interested in its work. Mr. Conrad's election to the N. E. M. A. Board of Governors is a gratifying recognition of the high place held in the electrical field by the Automatic company as an outstanding Independent telephone manufacturer.

Coaxial Cable Transmits Movies

A motion picture in sound was telephoned from New York City to Philadelphia on Nov. 9, over a coaxial cable.

The scenes and spoken words passed from the Bell Telephone Company laboratories to a special loudspeaker and a glass screen in the company's offices here.

They were the first sent over the new cable, which is capable of transmitting simultaneously the currents of 240 different telephone transmitters.

Frank L. Knapp, An Old Friend, Passes On

Frank L. Knapp, 72, Bellevue, Ohio, president of the Northern Ohio Telephone Co. died at his home in that city Monday forenoon, October 25. A heart attack following a severe cold proved fatal to the pioneer that spent 40 active years of participation in the Independent telephone industry.

His connections in the telephone industry were numerous, having served as president of the Ohio Independent Telephone Association from 1923 to 1926, a director of the United States Independent Telephone Association for almost a score of years, as first vice-president from 1934 to 1936; and as president of the Independent Pioneer Telephone Association in 1925-1926. At the time of his death, the company of which he was president consisted of 40 exchanges with stations numbering 23,540. He retired several years ago from active management, retaining the presidency.

Besides his interests in the telephone industry, Mr. Knapp was equally as well known as a successful banker. He was president of the Farmers & Citizens Banking Co. and chairman of the board of the Union Bank & Savings Co. of Bellevue. With the Ohio State Life Insurance Co., his services included 20 years as a director and 15 years as a vice-president. He served as acting president in 1936. His church activities included handsome gifts to the American Lutheran Church of which he was chairman of the board of trustees and investment committee. One gift was for $100,000 for home missions. He also was a director in the Crestlien Publishing Company and as a member of the board of regents of Capital University at Columbus during 1931 to 1936.

Surviving are his widow and four daughters, Mrs. H. H. Thornton of Oberlin, Mrs. H. A. Erf of Shaker Heights, Mrs. Allen Aigler and Mrs. William C. Henry of Bellevue.

VACUUM GRIP NEEDLE NOSE PLIERS... they fool you the way you like to be fooled!

NEEDLE nose pliers are commonly looked upon as the "weaklings" of the pliers family. Electrical workers EXPECT them to lose their gripping and cutting power at an early stage. Purchasing Agents are USED TO demands for frequent replacement.

But don't judge Vacuum Grip Needle Nose Pliers by ordinary makes. They'll fool you. Their ability to "take it" in daily use—over a long stretch of time—without a sign of breakdown—is amazing to those who use them for the first time.

Give them a tryout. Your men will like them. So will your Budget Chief!

No. 196—LIGHT WEIGHT HEAVY DUTY.—Very popular with electrical workers in the telephone field. Fitted with powerful cutters. Strong in construction. Full bow type handles. Spring tempered throughout. Length 6"—$1.85. No. 195—Same as 196. Length 5"—$1.75.

Same as above but without wire cutters: No. 96—6"—$1.50. No. 95—5"—$1.50.

No. 197 — EXTRA HEAVY DUTY. — An exclusive Vacuum Grip pattern built for those "tough" jobs, yet adapted to the more delicate operations. Real gripping power. Takes care of cutting jobs that ordinarily require 8" lineman pliers. Full fashioned handles, spring tempered. A powerful, rugged, long-life tool. Length 7"—$2.50.

Special prices on lots of one-half dozen or more

Name etched free on handles

FORGED STEEL PRODUCTS CO.
NEWPORT, PA.

Vacuum Grip Pliers
REG U.S. PAT. OFF.

BUILT UP TO A STANDARD
NOT DOWN TO A PRICE

OVER A MILLION IN USE

OUR 30-DAY TRIAL PLAN enables you to make running tests at our risk. Write for details and Catalog.

Add HS* to Pb and Sb

and you get a better cable sheath

★ HS—Human Skill—acquired through years of sheathing telephone cable for the Bell System—is the *extra* element Western Electric adds to lead (Pb) and antimony (Sb).

Human Skill expertly controls the heating and cooling of lead in the giant cylinders. Human Skill regulates the all-important speed of extrusion from the presses. Human Skill—backed by the finest machines—gives your cable a sheath that's uniform, rugged, good for years of trouble-free service.

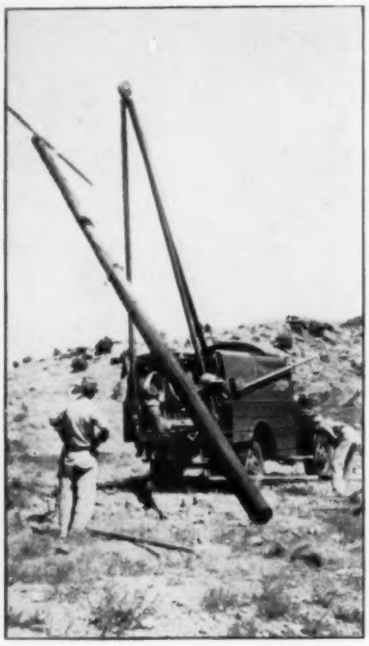
At Western Electric, Human Skill goes into every step in the manufacture of every kind of telephone cable you'll ever need. For details on standard types, or discussion of special types: write Graybar Electric Company, Graybar Building, New York.

Distributed by GraybaR

Western Electric

Distributed by GRAYBAR *Electric Company*

LEAD COVERED CABLE AND TELEPHONE APPARATUS



A hole having been bored to the proper depth, the telephone truck picks up a pole and drops it in position.

Scenes shown were taken on this job

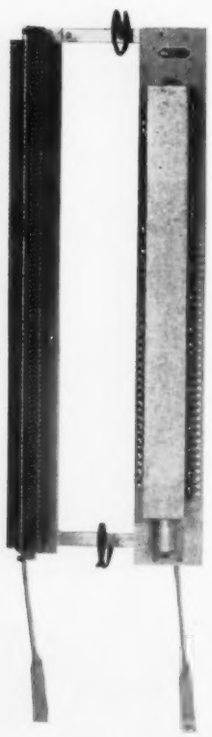
4TH TRANS-CONTINENTAL

The last of a line of some 12,000 telephone poles across a 290-mile stretch between Amarillo, Texas, and Albuquerque, N. M., the final link of the fourth transcontinental telephone line, will soon be set in place by the American Telephone & Telegraph Company. The erection of these poles is part of the largest construction project undertaken by the company since 1930.

The new line parallels the airway across the Texas Panhandle, striking overland with ruler straightness. In general, it follows the same route as the "Will Rogers Highway" new transcontinental route from St. Louis to Los Angeles through the former humorist's home town of Claremore, Okla. Cost of the project will exceed $2,000,000.

TELEPHONE LINE NEARS COMPLETION

A simple but ingenious contrivance plucks the two wires of a pair and they start dancing. If they keep step with each other for a few seconds they have substantially the same "sag"—a necessary refinement for the new carrier current system.



COOK TYPE U WALL FRAME

New—a wall type distributing frame consisting of a moisture-proof cable chamber on one side and standard Cook protector groups on the other.

The cable chamber provides for terminating a lead-covered, paper-wrapped cable inside the exchange. It eliminates the expense of a silk and cotton or wool end splice to the paper wrapped cable. There are no line terminal blocks, as the cable wires terminate directly on hollow studs in the cable chamber. Jumpers are run from these hollow studs to the protectors.

No cable splicer is necessary, as the outside paper-wrapped cable is brought directly to the cable chamber, which contains a self-soldering nozzle.

The protector may be any of Cook standard type, the No. 3800 which is on ⅜" centers is recommended because it requires so little space.

The illustration shows 100 pairs of Cook No. 3800 protectors anda cable chamber of 100-pair capacity.

This cable chamber is made in sections of 20-40-60 and 100 pairs high.

For full particulars of this economical, simple frame write to

COOK ELECTRIC CO.
2700 Southport Ave. Chicago

Leich's New Convertible Desk-Set Box

An entirely new desk-set box has been announced by the Leich Sales Corporation. In addition to serving the usual purpose of a desk-set box it can be later converted into the base for the Leich conventional handset, forming a self-contained telephone of the most modern type.

The box is neatly designed and unusually compact, the size being 6 inches by 4¾ inches by 1½ inches; the height being slightly increased when an induction coil is used.

The top and bottom plates of the desk-set box are of steel, treated to prevent rusting and then given a durable black finish which it is stated, will neither chip nor peel. The sides consist of a single piece of heavy moulded black Bakelite to match the base of the handset. The box is of the enclosed gong type with pleasing lines that fit perfectly with the modern base of the conventional Leich handset.

The ringer is of new and modern design, easily adjusted and equipped with deep, skirted gongs of different tones, providing a distinct and pleasing signal.

The outstanding idea in the designer's mind was to create a piece of equipment that serves its purpose today and may also be used tomorrow, fitting in with the change of trend in telephone instruments.

The National Convention

(Continued from page 16)

H. M. Stewart, executive secretary of the Pennsylvania Telephone & Traffic Association spoke at the annual conference and dinner for state association executives held the evening of October 12th. A very representative group of these executives was present and the toastmaster, who was formerly secretary of the Texas Association, was surprised by presentation of a resolution signed by the executives of that association commending him for his service before his acceptance of his present post in Pennsylvania. The president of the Texas Association, Oscar Burton of Tyler made the presentation.

The talk by E. C. Blomeyer on "The Practical Side of the Depreciation Problem" is one that will live on in the memories of those who were fortunate enough to hear it. Mr. Blomeyer has had long years of experience on this subject and the committee, of which he is chairman, has devoted many hours of study to this all important subject.

● The entertainment for the visitors outside of the regular sessions was a distinct feature during the entire meeting. Visiting ladies were entertained at luncheon on the second day at the Walnut Room of Marshall Field & Company who presented a special style show in their honor. 150 ladies were present at this entertainment which was planned and arranged by a committee composed of: Mrs. E. C. Blomeyer; Mrs. John Agee; Mrs. H. E. Billington; Mrs. H. T. McCaig; Mrs. G. B. Foscue and Mrs. Louis Pitcher.

The address by L. M. Berry on "The Independent Pioneer" was received with much enthusiasm. The pioneers under Mr. Berry's leadership as president, have the largest membership in their history. The business meeting heartily endorsed service of President Berry and secretary-treasurer, and founder, J. K. Johnson, who were reelected.

● The surprise banquet proved just that, with a record attendance that caused the committee on arrangements to have additional space provided for the over-flow. The type of entertainers made this occasion a happy one with congratulations on all sides to the committee in charge, composed of George W. Rodormer, Reliable Electric Company; John J. Jaap, Cook Electric Company, R. H. Burfiend, American-Automatic Electric Sales Company; H. T. McCaig, Stromberg-Carlson Mfg. Company; Roy W. Siemund, Leich Sales Corporation; M. A. Bellion, Kellogg Switchboard & Supply Company and Frank L. Eldrigde, Ray-O-Vac Company.

The address by Edwin M. Blakeslee of the General Telephone System, Madison, Wisconsin, presented a very interesting viewpoint to the Independents on "The Independents' Problem of Handling Special Service." This address was a result of much study and preparation and proved very enlightening to many who have not studied all sides of private line telephone service, private line tele-typewriter service and tele-typewriter exchange service.

Directors Re-Elected

E. C. Blomeyer, Chicago, vice-president, Theodore Gary & Co.

Frank E. Bohn, Fort Wayne, Ind., president Home Telephone & Telegraph Co.

James N. Cox, Cookeville, Tenn., president Southern Continental Telephone Co.

Charles C. Deering, Des Moines, Iowa, secretary-treasurer, Iowa Independent Telephone Association.

E. R. Hannibal, Everett, Wash., vice-president and general manager, West Coast Telephone Co.

W. N. McAnge, Jr., Bristol, Tenn., president, Inter-Mountain Telephone Co.

W. J. Melchers, Owosso, Mich., general manager, Union Telephone Co.

George A. Scoville, Rochester, N. Y., vice-president, Stromberg-Carlson Telephone Mfg. Co.

Samuel Tucker, Pleasanton, Kans., president Pleasanton Telephone Co.

George A. Yanochowski, Chicago, president, Kellogg Switchboard & Supply Co.

● At the closing session Friday, October 15th following Mr. Deering's discussion, Mr. Ralph C. Reno, vice president of the Telephone Management Company of Fort Wayne, Indiana, presented his address on "Rural Fire Insurance and the Telephone." He outlined the definite accomplishments of the national association during the past two years in securing recognition for the telephone as a means of protection on the farm with the result of lower insurance rates for the farmers. He further described the close cooperation the association of Fire Fighting Equipment Manufacturers have promised, to take over organizing work of fire departments and

More Hours of Service

. . . that's what every telephone engineer seeks . . . *more hours of service* . . . which means fewer replacements, lower service costs! And that's exactly what Ray-O-Vac telephone batteries offer!

For 3 decades Ray-O-Vac batteries have met and exceeded specifications and requirements on every recognized telephone and light intermittent test, and surpass all government standards. For lower service costs, specify Ray-O-Vac!

RAY-O-VAC COMPANY
Formerly FRENCH BATTERY COMPANY
MAIN OFFICES AND PLANT
MADISON, WISCONSIN
Additional Factories at Clinton, Massachusetts and Lancaster, Ohio

WHY KLEINS?

No. 201 N. E. Klein Side Cutting Plier. "Streamlined" for use in confined spaces.

Good workmen demand good tools. In the hands of men who know — everywhere — the pliers are invariably Kleins. Only the keen, hand-honed, perfectly matched cutting knives of Klein Pliers — only the comfortable spring grip in the Klein handles — only the general all around quality that is an inherent part of every Klein Plier can satisfy men whose work demands the best in tools. This, perhaps, explains why Klein Pliers are the standard of quality by which others are judged — why the name Klein has stood for maximum quality, "since 1857."

DISTRIBUTED THROUGH JOBBERS

Foreign Distributor: International Standard Electric Corp., New York

The four pamphlets listed below will be sent without charge to anyone interested. Check the ones you want:

- ☐ Safety for the Pole Climber.
- ☐ Specifications on Linemen's Belts and Safety Straps.
- ☐ The Safety Factor on Linemen's Leather Goods.
- ☐ Pocket Tool Guide.

Mathias KLEIN & Sons
Established 1857 — Chicago, Ill. U.S.A.

3200 BELMONT AVENUE

arrange for financing of same. The part the Independent telephone companies can play were discussed because of their key position in publicizing the plan to farmers in their communities.

● As mentioned in our September convention issue, the suppliers to the telephone industry presented the most beautiful and complete exhibits ever to appear at a telephone convention. More suppliers than ever before were in attendance and were rewarded for their efforts by wonderful attendance all during the 4-day session. New developments were shown in practically every exhibit. Candid camera shots of many of these exhibits are shown on other pages in this issue. Our September issue carried an outline of the products shown by advertisers in TELEPHONE ENGINEER during the meeting.

Iowa Rules That REA Must Share Costs

Ruling that electric supply lines must pay costs of wire and materials for metallicizing one side of grounded telephone lines paralled by electric lines, or pay for coils, housing, protection, and ground to isolate any section of telephone line not involved in the parallel, the Iowa State Commerce Commission made its long awaited decision on November 2 after the public hearing was held in Des Moines August 3.

It was ordered that part of the decision and order dated December 30, 1916, be modified as folows:

"(a) The supply companies shall bear the cost of furnishing one wire per circuit, with brackets and insulators, required for the installation of the second wire, for the portion of the communication line involved in the parallel with the supply line.

(b) The supply company shall bear the cost of furnishing repeating coils, housing protection and ground to isolate any section of telephone line not volved in the parallel.

For a Section of Telephone Line Outside the Paralell:

(1) Where the cost of material to metallicize a telephone circuit outside the parallel as described in (a) is less than the cost of repeating coil, housing, protection and ground, only the cost of the materials to metallicize the telephone circuit shall be borne by the supply company.

(2) In any other case where a telephone company desires to metallicize the entire telephone circuit outside the parallel and the cost of materials as described in (a) to metallicize the circuit is more than the cost of repeating coil, housing, protection and ground, only the financial sum equivalent to cost of repeating coil, housing, protection and ground shall be borne by the supply company.

(c) Where more wires are installed on account of metallicizing the telephone circuits, additional pole height may be required to provide clearance for communication wires crossing over permanent gateways and highways. In such cases the supply company shall bear the cost of additional pole height required and the labor cost of changing such poles.

(d) The supply company shall not be required to bear replacement cost of deteriorated materials, or materials which were originally inadequate in telephone lines. In such cases the cost shall be borne by the telephone company.

It is further ordered, that unless the telephone company will install the material described in (a) and (b) in the foregoing, the supply company shall not be required to furnish this material to the telephone company.

It is further ordered that electrical supply and communication companies if they agree so to do. Make financial settlements in inductive interference problems in a different manner than that provided in this order; and

It is further ordered, that the Iowa State Commerce Commission reserves the right to deviate from any provisions in this order where it deems advisable so to do."

Exide BATTERIES for every Telephone Service

THE ELECTRIC STORAGE BATTERY CO., *Philadelphia*
World's largest manufacturers of storage batteries for every purpose.

Joseph R. Thompson Joins Stromberg-Carlson

Joseph R. Thompson's appointment as sales representative for the Stromberg-Carlson Telephone Mfg. Co. in Michigan and Indiana has been announced by Ben Woodbury, telephone manager.

Mr. Thompson is well acquainted with the problems of operating companies and enjoys a wide acquaintanceship among telephone officials in his new territory. He received his background in telephone work with the Stromberg-Carlson company when he joined its sales division in the Rochester office in 1920. From 1926 until 1931 he was Stromberg-Carlson sales representative in the Michigan territory.

Mr. Thompson has been active in his new post since the first of October. He takes the place of Pete Winemiller, who has been contacting Michigan and Indiana companies temporarily since the death of Paul Myers, who formerly represented Stromberg-Carlson in those areas.

Handset Charge Eliminated

Effective January 1, 1938, the Pennsylvania Telephone Corporation will eliminate the extra monthly charge of 15 cents for handset telephones.

Elimination of the extra charge was announced October 28, through the Public Utility Commission at Harrisburg. The commission, in making the announcement, said the Pennsylvania Telephone Corporation is the first large phone company in the state to eliminate the extra charge.

Lenz Appoints Leich Sales Corp. As Distributors

The Lenz Electric Manufacturing Co., of Chicago have just announced the appointment of the Leich Sales Corporation as Distributors, handling the complete line of Lenz telephone and switchboard cords.

The Lenz Electric Manufacturing Co. have recently completed their 33rd year of building cords and cables for the telephone industry. They started in 1904 under the name of Runzel-Lenz Electric Mfg. Co., and continued under that name until 1930, when the name was changed to the present one, that of Lenz Electric Manufacturing Co.

Lenz have played an important part in this research work, and as a result we have today tougher textiles, better insulation and stronger conductors. A combination of all these things are passed service.

H. H. Van Luven of Los Angeles is also a distributor of the Lenz line of telephone and switchboard cords on the west coast.

Approves Arkansas Utility Sale

Transfer of power plants and distribution systems owned by the Southeast Arkansas Telephone and Power Company at Perry, Star City and Hampton to the West Memphis, (Ark.) Power and Water Company was approved by the state Utilities Commission on November 3.

Action of the commission came at the conclusion of a hearing on the transfer, and although no formal order was issued immediately, Chairman Thomas Fitzhugh announced that the commission would approve the transfer.

Completes New Office

The Star Telephone Company, French Lick, Ind., has moved into its new central office building. The new building is modern in every respect, even to the point of air conditioning. Constructiton is of brick and concrete and the interior trim is of birchwood having a walnut finish. Floor covering is battleship linoleum.

The company has completed laying its cables underground in the business district and all wires enter the new building in underground ducts. Mr. Edwin Plummer is owner and General Manager of the company.

D. F. Cash Joins Acorn Wire

The Acorn Insulated Wire Company, 225 King Street, Brooklyn, New York, announces that Donald F. Clash, has joined the Company as Factory Manager. Mr. Clash has been associated with the Anaconda Wire and Cable Company's Research Division for product development and manufacture.

At the Helm – in time of need

WHITNEY BLAKE TELEPHONE WIRE

"WB" wires are made to specifications that are always a step ahead of current telephone requirements. Any conductor—copperweld, bronze or copper—is available. Increased tensile strengths commensurate with conductivities required are always found in "WB" wire.

Illustrated is No. 22—INSIDE WIRE TWISTED PAIR 1/64" WALL SPEC. 4256.

Buy Your Wire by the Year, Not by the Foot

THE WHITNEY BLAKE COMPANY
NEW HAVEN, CONNECTICUT

WB

GraybaR QUALITY

Distributed and guaranteed by GraybaR ELECTRIC COMPANY

Foreign Distributors: International Standard Electric Corporation, 67 Broad Street, New York City.

Sole Selling Agents in U.S.A.

The Clearing House

For the convenience of readers of Telephone Engineer

Accounting Systems

ACCOUNTING

HERDRICH and BOGGS
Certified Public Accountants
803 Electric Building
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Kenneth B. Hopkins of Graybar Receives New Appointment

Kenneth B. Hopkins, well known to the Trade Journals in his former position of Assistant Sales Promotion Manager of Graybar Electric Company, has been appointed Assistant Supply Sales Manager of Graybar, in charge of Street Lighting Materials, Tools and Solderless Equipment. He will report to George F. Hessler, Assistant General Sales Manager.

Ken Hopkins came with Graybar in 1925 as a Copy Man in the Advertising Department. In 1929 he was made Assistant Advertising Manager. He specialized in Trade Paper activities and co-operative work with many of the Suppliers whose lines he will now supervise. His close contact with the representatives of these manufacturers and his understanding of their problems made him a logical choice for the position of Assistant Supply Sales Manager.

New Clip For Tester

For a number of years the Test-O-Lite has been widely used by electricians, mechanics and householders for testing electrical circuits. Today it is a standard tool in almost every shop. Recently, an improvement has been made in this product which includes a pocket clip for holding the Test-O-Lite firmly in the pocket, preventing its being readily lost. This pocket clip was added at the request of many users. Another improvement is increased senitivity so that it more easily detects the presence of voltage from 90 volts to 500 volts A. C. or D. C. by the small neon lamp located in the body of the tester. It is found extremely useful in locating burnt-out fuses, leaks, short or open circuits, or defects in wiring.

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